



SECTOR 1 — CHART INFORMATION

SECTOR 1

COASTS OF GUYANA, SURINAME, FRENCH GUIANA, AND NORTH BRAZIL

Plan.—This sector describes the coasts of Guyana, Suriname, French Guiana, and North Brazil. The first part describes the NE coast of South America from Rio Orinoco to Cabo Orange. The sequence of coastal features is from W to E.

The latter part of the sector describes the N coast of Brazil from Cabo Orange to Ponta Curuca and is arranged in a N to S sequence. The lower reaches of the Amazon River, Rio Para, and the upper reaches of the Amazon River are then described in that order.

General Remarks

1.1 Winds—Weather.—The trade winds are mostly ENE, between Rio Orinoco and Cabo Orange, in the open sea from November to July. They are strong and steady from January to April, with about 80 percent of all winds of Beaufort force 3 or over. Force 5 or 6 are common. From August to October, the prevailing winds are E to SE, but these winds are less steady than the more N winds of other months.

Gales along this coast, which is S of the hurricane belt, occur about one percent of the time from February to April.

The main relatively dry season, which is sharply marked almost every year, is from September to November. The wet season is from May or June to August and begins earlier along the coast to French Guiana.

Fog or haze is more common on the coast. In the dry season, coastal mist or haze is often present in the forenoon, but visibility is usually good after noon.

The average air temperature along this coast is within a degree or two of 27°C. Temperatures above 32°C are uncommon. The sea temperature range from 27°C to 28°C except in February when they may be slightly lower.

Tides—Currents.—The full strength of the Guiana Current is encountered off this coast. The great majority of sets are between W and NNW in November to April and between WNW and N in May to October. The most predominant set throughout the year is at a rate of 1.25 knots. This current is quite constant but occasional sets in other directions may be experienced. Rates of up to 3 to 4 knots may occur throughout the year; the latter rate in May to July and in November to January with normal sets. The rates of other sets sometimes reach 1.5 knots.

The current is not felt close inshore. The band of width of the current apparently fluctuates. The greatest strength of this current is from 60 to 120 miles offshore.

The inner edge has been found about 20 miles off the coast of Guyana at 7°10'N, 58°00'W. Between the Demerara River and the Suriname River, it is felt in depths of 32.9m.

The main current circulation is affected by tidal current influences as far as 30 miles offshore. The W tidal currents increase the rate experienced and the E tidal currents lessen the rates. At the mouths of rivers, the tidal currents set S on the

rising tide; however, on the falling tide, they are deflected by the currents to NE.

Heavy rollers may be experienced along this coast from December to February, particularly in December and January when the NE trades are strongest. These rollers usually are observed where depths decrease irregularly or in depths of about 9.1m where the coastal mud and sandbanks lie.

The tidal currents along the N coast of Brazil are regular and their rates increase progressively W. The currents follow the trend of the coast and are strongest inshore where depths are shallowest. The distances at which their effects are felt depends largely upon the wind and the offshore depths, but in general, the tidal currents are not felt more than 6 to 8 miles offshore.

The coasts of Guyana, Suriname and French Guiana are mostly low and forested with mangrove and tropical vegetation. The extensive coastal banks and shoals fronting much of these coasts require that ships along these coasts be well offshore outside the sight of land except when approaching a port. Much of the charted hydrography is from old and imperfect surveys. This fact coupled with the estuarial nature of the river ports and continual changing of the bar depths requires the utmost prudence in navigation.

Except for the anchorage at Iles du Sulut and French Guiana, there are no sheltered anchorages for large ships.

Ships of moderate size and limited draft can gain access to the ports of Georgetown and Paramaribo at favorable tidal conditions.

The N coast of Brazil, except for a few stretches of Estado do Ceara near its E part, is low and formed of sandhills about 49 to 79m high. The sandhills are similar in appearance being interspersed with reddish cliffs and clumps of mangroves. The mangroves are usually observed at the mouths on the W banks of the rivers, which they serve to mark.

The entrances of the rivers along this coast are as a rule open to the N and are obstructed by sandbanks. Many of the rivers are gradually silting up and will admit only small coasters. Ships can anchor along the N coast in good weather; however, the sea becomes rough at times during flood tides.

Guyana

1.2 The coast of Guyana between Punta Playa, the N boundary, and Courantyne River, the S boundary, is mostly low with few conspicuous landmarks. The coastal bank extends up to 25 miles offshore. There are no sheltered harbors for large ships. Ships of limited draft can proceed to Georgetown on the Demerara River and to New Amsterdam on the Berbice River, but must cross the bars of these rivers and engage pilots.

The coastal bank has been reported as changing, and because of the old and imperfect surveys the mariner must navigate the area with utmost care. Numerous wrecks exist along the coast and off the entrances to the rivers. Due to the shallowness of the water, almost all are dangerous to navigation.

Punta Playa to Georgetown

1.3 Punta Playa (8°33'N., 60°00'W.), low and swampy, lies near the middle of the NE side of Corocora Island and on the boundary between Venezuela and Guyana. It is marked by a boundary beacon.

The Waini River flows NW, parallel with the coast. It empties into the sea W of **Waini Point** (8°24'N., 59°49'W.), a thickly wooded point which can be seen at a distance of about 12 miles. A light is shown from the river bar, about 5 miles N of Waini Point. A shoal, with a depth of 0.6m lies 8.5 miles N of Waini Point, and is marked by a lighted buoy. A 4.9m patch lies approximately 13 miles N of Waini Point, and mud flats with depths of 2m or less extend 4 miles from the point.

The river entrance may be recognized by its position in relation to the hills at Cumacka which are about 46m high, and lie about 17 miles S of the entrance. These hills are the only ones of any elevation for miles along this coast. They are usually visible at dawn and have the appearance of a knoll.

A channel, marked by lighted beacons, leads across the bar, which has a least depth of 1.8m. Vessels of 3m drafts and with local knowledge can enter the river at HWS. Vessels which are prepared to take mud have crossed the bar drawing as much as 3.7m.

Port Kaituma, on the Kaituma River, lies 66 miles from Waini Bar Light, and is used by vessels to load manganese ore. A vessel which can cross the Waini River bar should have no trouble reaching Port Kaituma provided that caution is exercised on river bends and junctions where strong eddies are to be expected.

There is one berth at the port; it can accommodate vessels up to 3,500 dwt.

Caution.—The area from 30 miles N to 35 miles E of Waini Point is strewn with dangerous wrecks.

1.4 The mouth of the **Pomeroon River** (7°37'N., 58°45'W.) lies about 78 miles SE of Waini Point and its W entrance point is marked by a light. The river can be entered by vessels with drafts of up to 2.4m between 1 hour either side of HW.

Lights are shown from pilings about 4 miles NNE and 1.75 miles NNW, respectively, of the mouth of the river, and indicate the best route to follow when entering the river.

When approaching from seaward, they should be kept to port in order to avoid the extensive mudflats to the E and the shallow water to the W of the entrance. There is no channel leading to the river.

The river mouth, about 0.1 mile wide, has depths of 4m in the entrance, but there are depths up to 18m, about 15 miles upriver.

The depths of water near the river mouth are subject to seasonal changes, due to the increased flow of water during the rainy season. The volume of traffic also affects the depths of the approaches, as it tends to plow a way through the mud.

Truchen, about 2 miles from the river mouth, stands on the E bank and has a wharf which can accommodate small vessels up to 30m long with drafts of less than 1.5m.

Charity, another small village, about 21 miles from the river mouth, has a wharf for river steamers with drafts of 2.4m.

1.5 From the mouth of the Pomeroon River to the mouth of the Essequibo River, a distance of about 45 miles to the SE, the coast is low, wooded, and without prominent features.

The chimney of a mill at **Anna Regina** (7°16'N., 58°29'W.) is conspicuous and visible for 15 miles on a clear day. A radio tower with lights stands close SE of the chimney. A stranded wreck, marked by a lighted buoy, lies 5.75 miles NNE of the chimney.

Pilotage.—Pilotage is compulsory for vessels entering and leaving the harbors of Georgetown, New Amsterdam, and the Essequibo River. The pilot boarding ground for vessels proceeding to Georgetown, New Amsterdam, and Essequibo lies within the NW quadrant of a circle with a radius of 0.5 mile with its center at the Demerara Lighted Beacon. Pilots are stationed at Georgetown.

Every application for a pilot, whether made through the Wireless Station direct from the ship, or through agents, should be accompanied by the vessel's draft particulars.

Should these not be given, the Harbor Authority will assume, with the exception of vessels proceeding directly to New Amsterdam, that the vessel concerned will enter the harbor of Georgetown at or near HW, and pilotage will be arranged accordingly.

All ships are requested to amend their ETA, as required, by special message through the wireless station to their Agents and to the Harbor Authority.

Vessels in the vicinity of Demerara Pilot Station should listen for the Georgetown Lighthouse on VHF channel 16.

Essequibo River

1.6 This, the largest river in Guyana, rises in the Acarai Mountains, in the S extremity of the country, and flows N for at least 600 miles, traversing the entire length of the country.

At about 45 miles from its mouth, it is joined by the Mazaruni and Cuyuni Rivers. The port of Bartica stands at the junctions of the rivers and is used by ships of limited draft.

Navigation of the river is, in general, not difficult, but during the rainy season, frequent squalls obscure the river marks and aids. Vessels generally anchor until squalls pass over.

Tides—Currents.—The tidal currents at the mouth attain rates of up to 3 knots at springs but decrease from 2.5 to 2 knots outside. The tidal rise at springs is about 2.7m at the mouth and about 2.4m at Bartica. The river level changes with the seasons, being highest in June and lowest in November.

The maximum difference in mean level may amount to over 0.9m. The tidal influence in the river is felt as far as Aritaka, about 17 miles above Bartica.

Depths—Limitations.—At the entrance to Ship Channel, the main entrance to the river, is a bar with a least depth in the fairway of 2.1m. A ship that can cross the bar can ascend the river to Bartica and the Mazaruni River to D'Urban Island about 50 miles from the sea and 1 mile below the first rapids.

The estuary of the river is encumbered by a number of islands from which shoals and sandbanks extend from the outer islands to the 5.4m curve which lies as far as 17 miles seaward.

Frequent changes in depths in the river and estuary are liable to occur owing to the shifting nature of the banks.

The sand banks on both sides of Ship Channel are fairly steep-to and must be approached with caution.

Sandbanks, steep-to on their N sides, are characteristic of that part of the river between Mamarikuru Bank, 10 miles below Bartica, and Lamun Island, just above Bartica. These steep-to edges are almost at right angles to the direction of the tidal currents. Tide rips occur during ebb tide at these steep-to edges.

The main entrance of the river is through Ship Channel which is entered between Leguan Island and the mainland.

The river fairway is marked in places by navigational aids which are changed with the shifting shoals and require local knowledge to clear them. The twin chimneys, located about 5 miles SSE of the NE end of Leguan Island, are good landmarks.

West Channel and Middle Channel, both N of Ship Channel, also lead into the Essequibo River. However, the use of West and Middle Channel has been discontinued.

Pilotage.—Pilotage is compulsory, and can be obtained and arranged through the port of Georgetown.

Anchorage.—Ships can anchor in Ship Channel. However, the tidal currents are strong and raise a confused sea, which is dangerous to small boats, especially on Bluejacket Banks, located about 5.2 miles E of the NE end of Leguan Island.

In the river, ships should anchor with bow and stern anchors because with a single anchor the wind will invariably carry the vessel over her anchor at the slackening of the falling tide, thus causing a foul anchor. It is almost impossible to find a lee in the river as the wind follows the line of the banks below the level of the forest.

Caution.—Several submarine cables cross the river, and anchorage is prohibited within 0.25 mile of either side of a cable. The landing places of the cables are marked by white diamond-shaped boards marked "CABLE" in black letters.

1.7 Bartica (6°25'N., 58°37'W.) ([World Port Index No. 12360](#)) is situated on the E side of the point separating the Mazaruni River from the Essequibo River. The port has no facilities other than a few small timber wharves, jetties, and landing slips. These are generally used by coasters, river craft, and barges. Ships handle cargo from barges at the anchorage close off Bartica. The anchorage has depths of up to 11.4m.

Georgetown (6°50'N., 58°10'W.)

[World Port Index No. 12370](#)

1.8 Georgetown is the capital and principal commercial center of Guyana. The port lies on the E bank of the Demerara River, about 11 miles ESE of Ship Channel. The city has a river frontage of about 2 miles.

Winds—Weather.—The average temperature throughout the year is 27°C. The heat is tempered by sea breezes from August through October. There are two rainy seasons: one from mid-April to mid-August and the other from mid-November to mid-January.

The prevailing winds are from the NE with a maximum speed of 11 knots during the months of heaviest rainfall.

Tides—Currents.—The mean HW interval at the river mouth is 4 hours. The tidal rise at MHWS is 2.9m at MLWS, 0.4m at MHWN, 2.2m; and at MLWN, 1.7m.

On the bar the tidal currents attain rates of 1.5 knots on the flood and 2.75 knots on the ebb. They are not usually experienced over 10 miles off the river mouth. They increase in strength within the river mouth at springs to about 3 knots and greater during freshets.

In the river the flood current attains a rate of 2.5 knots during the dry season and continues to flow on the surface for more than an hour after HW. The ebb current attains a rate of 3.75 knots at springs. At neaps, the maximum rate of flood and ebb currents is about half of that at springs. The average duration of the ebb current is 7 hours 10 minutes.

During freshets, the currents in the river may attain a rate as great as 7 knots. A peculiarity of the tidal currents is an occasional SE set, known as Scapy or Jack Tide, which crosses the harbor area from Best Groyne and usually occurs toward the end of the flood at spring tides.

The effect of this current is to press ships against the piers; when this happens considerable difficulty is occasionally experienced by departing ships. Scapies are of short duration that last an average of about 45 minutes.

Depths—Limitations.—The approach to the river is obstructed by a mudflat which extends about 10 miles NE from the entrance points. This mudflat is subject to change.

The Harbor Authority published a depth of 3.1m for the channel on the understanding that it might vary by 0.6m. The least charted depth across the bar was 2.7m. It was reported that a ship drawing 6.7m could cross the bar at HWS. It has been reported that the bar and approach channel are being dredged to 7.4m and the channel is marked by lighted buoys.

The mud on the bottom is known locally as "sling mud." It is from 0.6 to 1.2m thick, and is of a very soft, almost liquid consistency. Ships of 10 knots or more can force a passage through this "sling mud" even though drawing 0.3m more than the actual depth of water.

In the approach to the river within about 35 miles of land, the water becomes discolored and patches of a dark, suspicious hue will frequently be met, but no danger has been found. The outer limits of this discolored water will alter with the seasons.

It has been observed that during the rainy season the water has a reddish tinge between the Demerara River and the Maicony River, about 24 miles to the ESE.

Ships normally leave Georgetown 2 or 3 hours after HW on the bar, depending on draft.

There are 6 cargo wharves ranging from 59 to 228m in length with depths alongside ranging from 4.8 to 6.1m at LWS; but as the bottom is soft mud, vessels may safely lie aground alongside.

There are also 4 tanker berths with depths of 3.8 to 5.6m alongside.

The Demerara Sugar Terminal, situated at the S end of the port, has a wharf 126m long, with an alongside depth of 5.5m and can accommodate vessels up to 161m long.

Aspect.—Georgetown Lighthouse, 30m high, white octagonal tower with red stripes, stands near the E entrance point of the Emerara River. A conspicuous hotel stands near the coast about 0.1 mile ENE of the lighthouse.

Saint George's Cathedral, with a conspicuous spire, stands about 0.6 mile S of the lighthouse. The red-painted clock tower of the market, standing 0.3 mile SW of the cathedral, is conspicuous.

A red chimney, about 6 miles E of the river mouth, is conspicuous from the E. A beacon near the coast and about 9 miles SE of the red chimney is also conspicuous. Buoys and range lights can best be seen on the area chart. A number of wrecks lie off the coast and near the harbor entrance, most of which are marked by buoys or lights.

Regulations.—The following are extracts from the harbor regulations:

- Every application for a pilot is to be accompanied by the draft particulars of the ship.
- Should the draft particulars not be advised, the harbor authorities will assume, with the exception of ships proceeding directly to Berbice River, that the ship concerned will enter the port of Georgetown at or near the time of HW, and the pilot attendance will be arranged accordingly.
- All ships are particularly requested to amend their ETA, as required by special message through the coastal radio station to their agents and to the harbor authorities. Ships in the vicinity of the port or pilot station should listen for the pilot boat on VHF channel 16.
- A ship with an infection on board should anchor in the quarantine anchorage and await the arrival of the port health officer. The master should advise the harbor authorities by special message through the coastal radio station, in order that the attendance of the port health officer can be arranged without delay. The customs boarding officer boards each ship close seaward of the harbor entrance.
- Masters are particularly warned that it is forbidden to lower a boat, or to communicate with the shore or other ships, or to allow persons or things to leave the ship until the customs boarding officer has granted permission.

Anchorage.—Anchorage can be taken in the river in 6m abreast the berths in Georgetown and in the anchorage berths marked "A" through "E" on the harbor chart. The holding ground is good with a mud bottom.

Ships proceeding to Linden in ballast and drawing less than 4.5m are anchored in the S limit of Georgetown Harbor. Ships of more than 4.5m are anchored within the harbor, but towards the S end.

The limits of the quarantine anchorage are shown on the chart in a position about 10 miles NE of Georgetown Light.

Caution.—Less water than charted has been reported in the approaches to Georgetown.

There have been reports of pirate attacks on merchants in the area.

1.9 Linden (MacKenzie) (6°00'N., 58°18'W.) ([World Port Index No. 12380](#)) lies on the E bank of the Demerara River, 56 miles above Georgetown, and is important as a bauxite ore terminal, having a maximum draft of 6.6m.

Ships of 22,000 dwt are accommodated on a very regular basis. The draft is dependent on depths across the bar at Georgetown and across the shoals in some reaches of the river.

Ships are normally loaded about 0.3m in excess of the least depth on the bar at Georgetown, but at this draft they must anchor off Sand Hills, about 28 miles upriver from Georgetown, and await the following tide. Ships normally leave Linden 2 hours after HW on the bar at Georgetown.

Two ships cannot pass at some river bends at the same time. Speed of ships is limited to 10 knots by regulations. Transit can

be made at night but should be avoided because of river fog and mist which occurs frequently after midnight.

A jetty for the use of inshore fisherman is situated at Houston on the E bank S of Georgetown.

Rome terminal, with a wooden T-head pier about 35m in length, is situated just S of Houston, it is used for the discharged of petroleum products, including LPG and has an alongside depth of 3.5m. It was reported that a vessel with a draft of 3.5m made aground at this berth at LW.

A pontoon bridge, located 2 miles upstream from Georgetown, has two central retraction sections, which provide an opening 77m wide.

The tidal range at the bauxite terminal is about 0.3m less than at Georgetown at springs and less at neaps.

Depths—Limitations.—There are 2 bauxite berths accommodating vessels up to 173m in length and a draft of 6.4m.

An aluminum loading berth, lying about 1 mile N of the bauxite berths, can accept vessels with a maximum beam of 25.9m. An oil berth with a wooden jetty is situated about 1 mile S of the pontoon bridge on the E bank of the river. The berth is 50m long with a depth alongside of 3.8m. There are no facilities for handling LPG.

The principal oil terminal for the port is situated on the E bank of the river consist of 2 tanker berths. Vessels up to 137m in length can berth at the Texaco Terminal, a small T-headed pier consisting of wooded pilings and a platform having an alongside depth of 5.5m.

Pilotage is compulsory, and is necessary for safe navigation up the river.

1.10 From the mouth of the Demerara River to the mouth of the Berbice River about 50 miles to the SE, the coast is low and without prominent features. Mudflats front this part of the coast as far as 6 miles offshore and the 10m curve lies as far as 12 miles offshore in places.

A light is shown near the shore at the town of **Clonbrook** (6°44'N., 57°57'W.), about 17 miles ESE of the mouth of the Demerara River. A prominent beacon stands about 0.5 mile SE of the light. A conspicuous radio mast is located about 13 miles SE of Clonbrook Light.

New Amsterdam (6°15'N., 57°31'W.)

[World Port Index No. 12390](#)

1.11 The port of New Amsterdam is situated on the E bank and about 5 miles within the mouth of the Berbice River.

Tides—Currents.—The tidal rise off New Amsterdam at springs is 2.5m and at neaps is 1.3m. The flood sets SW at about 3 knots and the ebb to the N at about 5 knots. The rising tide is reported to set in a position about 1 mile NE of Berbice Light.

Depths—Limitations.—The approach to the river entrance is obstructed by a shallow muddy shorebank that extends about 3 miles NNE and 4 miles to the N, respectively, from St. Andrew Point. The 5m curve lies at the seaward end of the approach about 8 miles NNE of the above point. Within this curve, depths shoal regularly to the shorebank, which may be

marked by breakers at LW. A heavy ground swell is frequently experienced in this area.

The entrance bar, formed by the shorebank, has a least charted depth of 1.5m through the channel which leads to the river mouth. The channel has a least charted depth of 2.1m inside the bar. The bar is composed of fairly hard mud. Ships may cross the bar on even keel loaded to 0.9m less than the Demerara Bar predictions. The river entrance is subject to silting. It has been reported (1995) that there was a dredged depth of 7.9m over the bar.

At **Everton** (6°12'N., 57°29'W.), about 4 miles upriver from New Amsterdam, there is a bauxite-loading terminal. Ships berth starboard side-to. The pier is 457m long, with a depth alongside of 7.6m.

A bauxite loading terminal, with a loading basin dredged to a depth of 10m, has been established E of the channel in a position N of Crab Island.

Aspect.—**St. Andrew Point** (6°19'N., 57°31'W.), the E entrance point of the river, can be easily distinguished at a distance of 5 miles. Two chimneys stand about 8 miles E of the port and are conspicuous radar targets at 23 miles.

Pilotage.—Pilotage is compulsory. Pilots are obtained from Georgetown. Advanced notice of 24 hours must be given.

Vessels waiting for the tide can anchor 1 mile NE of Berbice Light.

Anchorage.—Ships can anchor in 4.6m about 0.1 mile off the middle of Crab Island with the S church at New Amsterdam in range with the S end of the island.

Caution.—Submarine cables cross the river off New Amsterdam. The landing places are marked by white diamond-shaped boards with the word "Cable" in block letters. Anchorage is prohibited within 0.25 mile of either side of these cables.

1.12 From the mouth of the Berbice River the coast trends ESE for about 8 miles and then SSE for about 22 miles to the mouth of the Courantyne River. This coast is low, sparsely wooded, and without prominent features. Mudflats with depths of less than 5.5m from this part of the coast as far as 6 miles offshore.

Soundings are the best guide for this stretch of the coast as the charts are not very accurate.

Suriname

1.13 The coast of Suriname between the Courantyne River, the W boundary and the Maroni River, the E boundary lying about 195 miles E, is mostly low with few landmarks.

The coastal bank extends a considerable distance offshore. Paramaribo, on the Suriname River, is the only port of any shipping importance along this part of the coast.

The coastal bank contains most dangers and lies as far as 23 miles offshore. The dangers such as wrecks, can best be seen on the area charts.

Courantyne River (Corentyn River) (6°00'N., 57°07'W.) marks the boundary between Guyana and Suriname.

The MHW interval at the river mouth is 4 hours. The tidal rise at springs is 3.2m and at neaps is 2.2m.

The flood current sets SW, the ebb sets NE, and during the rainy season the latter attains a rate of 3 to 3.5 knots; its influence is felt up to a distance of 10 to 12 miles offshore.

The edge of the current is distinctly marked by discolored water.

The river entrance is reported to be fronted by a bar which partly dries. Vessels with a maximum draft of 4.7m can enter at HWS; vessels with a draft of 3.7m can enter at LWS.

During December, January, and February a heavy sea frequently prevents ships with more than 2.7m draft from entering, due to the risk of hitting bottom.

Ships that are able to enter the river can proceed to Tropica, Suriname, about 47 miles above Skeldon, which is about 4 miles inside the mouth of the river. Ships seldom ascend the river above Skeldon.

The most prominent landmarks to be seen on the approach to the river are the radio mast with obstruction lights at Skeldon, the aviation light at Nieuw Nickerie, and the chimney at Waterloo, which is 5.2 miles ESE of the river entrance.

Vessels can obtain anchorage in the river off Skeldon in 5.0 to 6.4m. Vessels can also anchor off Springlands inside the river.

Nieuw Nickerie (5°57'N., 57°00'W.)

World Port Index No. 12405

1.14 Nieuw Nickerie lies on the S bank of the Nickerie Rivier, about 2 miles above the mouth of the river.

Tides—Currents.—Tidal currents off the entrance to the Nickerie Rivier set SW and NE, attaining a maximum rate of 4 knots at springs.

Depths—Limitations.—The fairway across the bar has a least depth of about 1.2m at LWS which controls the draft of ships proceeding upriver for 24 miles to Wageningen. The bar consists of an extended bank of soft mud. At MHW the bar is passable for ships with a draft of 4m and a maximum length of 130m. The river is navigable for vessels up to 3,000 dwt and with a draft of 4.3m for about 30 miles above Nieuw Nickerie.

There are two wharves in the town. The Surinam Navigation wharf is 87m long with a depth alongside of 3.3m. The government wharf is 118m long with a depth alongside of 6.1m. A berth for tankers is located 1 mile inside the mouth of the river and consists of 3 small jetties that can accommodate vessels up to 100m long and a maximum draft of 4.4m.

Aspect.—A light is shown from the W entrance point of the river. Another light is shown about 0.7 mile SE of the W entrance point of the river near the police station. A tank stands 1.75 miles WSW of the river's entrance.

Pilotage.—Pilotage is compulsory and requests for a pilot must be made to the harbormaster at Paramaribo at least 48 hours before arrival and corrected as necessary 12 hours before arrival. A pilot is available both night and day at Nieuw Nickerie. The pilot boards near the lighted buoy about 4 miles N of the entrance of the Nickerie Rivier.

Anchorage.—Vessels with a 4.5m draft can safely anchor 3 miles NNE of the sea buoy. It is not advisable to anchor in the river for any length of time due to the river being so narrow that swinging room is restricted.

1.15 Paradijs (5°54'N., 56°56'W.), about 6 miles upriver from Nieuw Nickerie, has a pier for small ships. Just above Paradijs there are remains of an old pier in the river which should be avoided by keeping close to the right bank.

Wageningen (5°46'N., 56°41'W.) is a port about 24 miles upriver from Nieuw Nickerie, and can be reached by vessels which can reach Nieuw Nickerie. The river is only 70m wide at this point, which restricts vessels to a maximum length of 110m. There is a wharf 118m long located here.

From the mouth of the Nickerie Rivier to the mouth of the Coppename River about 62 miles to the E, the coast is low, flat, and covered with mangroves and forest. Several creeks flow into the sea along this part of the coast. A radio mast stands about 23 miles W of the entrance of the Coppename River. A number of sand banks are contained within the 5.5m curve which lies up to a distance of 10 miles offshore.

Coppename Rivier—Saramacca Rivier

1.16 These rivers have a common mouth which is easy to identify as the coast recedes considerably from **Saramacca Punt** (5°54'N., 55°58'W.), the NE entrance point of the Saramacca Rivier. This point is conspicuous from the E and the W. The Saramacca Rivier, about 150 miles long, is navigable for about 63 miles upstream for vessels that can cross the bar. The least depth across the bar is 1.2m. The depths gradually increase upriver.

Caution.—Numerous dangerous wrecks lie in the N and E approaches to the common mouth of the rivers.

Coppename Punt (5°49'N., 55°55'W.) separates the two rivers.

The Coppename Rivier, about 100 miles long, is navigable for coastal vessels for 38 miles upstream. The least charted depth in the channel over the bar is 2.1m close W of Coppename Punt. A conspicuous radio mast stands on the E bank of the river, about 8 miles SSE of Saramacca Punt.

The Coeswijie Rivier is a tributary of the Coppename Rivier, and flows into it on its E side about 4 miles below Coppename Point.

The Wayombo Rivier flows into the Coppename Rivier on its W side, about 34 miles below Coppename Punt. The Coppename Rivier is still navigable for small vessels up the mouth of Arawarra Creek. The creek forms the connection between the Wayombo Rivier and the Nickerie Rivier.

Pilotage.—Pilotage on both rivers is compulsory for vessels exceeding 50 grt. A pilot should be requested at least 24 hours before arrival from the Harbormaster at Paramaribo, giving the probable time of arrival and draft.

From the mouth of the Coppename Rivier the coast trends E for about 45 miles to the mouth of the Suriname Rivier. The coast is low, sandy, and wooded. The tree tops are visible from a distance of 15 miles offshore. Mudflats front this part of the coast as far as 3 miles offshore and the 5.5m curve lies as far as 10 miles offshore.

Suriname Rivier

1.17 The mouth of the river forms a recession in the shoreline S of **Braampunt** (5°58'N., 55°10'W.), the NE entrance point of the river. This point is low but well defined.

The S shore of the river mouth is very low and difficult to distinguish from offshore. The port of Paramaribo lies on the W bank, about 13 miles within the mouth of the river. Ships of moderate draft and size can enter the river and be accommodated at Paramaribo, Smalkalden, and Paramam.

Caution.—Rollers occur off the river entrance between December and March.

Paramaribo (5°50'N., 55°10'W.)

World Port Index No. 12410

1.18 The port of Paramaribo is located on the W bank of the Suriname Rivier, about 13 miles upriver from its mouth.

The port is the capital and center of the overseas trade of Suriname.

Winds—Weather.—The climate is tropical. There are two rainy seasons; a short one lasting from mid-November to mid-February, and a longer one lasting from mid-April to mid-August. The highest temperatures are in August, September, and October while the lowest temperatures occur in January and February.

The prevailing winds are from the NE.

Tides—Currents.—The MHW interval at the river mouth is 4 hours. The tidal rise at springs is about 2.2m and at neaps is about 1m.

Off the mouth of the river the flood current sets to the W and the ebb current to the E. The NW coastal current predominates over the tidal current. In the river the water level recedes 0.4 to 0.6m before the beginning of the ebb current in mid-channel. The tidal influence extends for a distance of about 100 miles above the river mouth.

Depths—Limitations.—There is a new oil terminal platform, about 22m long with jetty moorings about 174m apart. The terminal has a least draft at LWS of 5.5m.

There is a new harbor consisting of a wharf, 533m long, with a depth alongside of 7.6m at the N end and 6.4m at the S end. It is used for general cargo. Four ocean-going vessels can berth simultaneously.

There is berthing space for vessels of the Suriname Navigation Company with a minimum depth of 3.9m.

Bacoven Wharf, a banana pier, is 90m long with a least depth alongside of 5.5m. Flour Pier, privately owned, consists of a platform 11m long and moorings 49m apart.

Vensur Cement Pier, also privately owned, has a wharf 55m long with a depth alongside of 4.2m and moorings 183m apart. Vessels up to 219m long can be accommodated.

New Wharf is 551m long and has a depth alongside of 5.7m. and is used for general cargo. The Shell Oil Terminal is 46m long with an alongside depth of 4.9m. The moorings are 164m apart.

Belwaarde Wharf is 85m long with reported alongside depths of 5.5 to 6.1m. It is used for sugar. It was reported that the strong current, combined with the suction from passing ships, causes considerable strain on berthing lines.

The least depths at LWS in the channel are as follows: Outer buoy to New Amsterdam 4.6m, New Amsterdam to Paramaribo 5.1m; Paramaribo to Domburg 5.2m; Domburg to Paranam 5.2m. Depths in the river and its approaches are subject to change and bars are liable to form.

Ships loaded deeper than the bar draft regularly navigate through these channels, as the bottom is of very soft mud and ships can easily plow through. Vessels leaving the river regularly load to a draft of between 6.7 and 7.0m.

Two stranded wrecks lie 18.5 and 17 miles NNW of Braamspunt. There are other wrecks which exist in the area and can best seen on the area charts.

Another dangerous wreck lies in the middle of the river, 0.3 mile W of **Suzannasdaal** (5°52'N., 55°05'W.).

Discolored water from the river has been observed a considerable distance offshore.

There are three wharves for loading ores. Dock No. 1, 111m long with a minimum depth alongside of 5.1m, Dock No. 2, 126m long with a depth alongside of 10m; and Dock No. 3, 361.5m long with a minimum depth of 5.6m.

Aspect.—Suriname River sea buoy lies about 7 miles NNW of Braams Point. The channel, marked by lighted buoys and beacons, begins about 2.2 miles S of the sea buoy.

Positions of the channel buoys and beacons are subject to change without notice, many of them maybe missing or extinguished.

An entrance light is located on the S bank, about 6 miles SW of Braams Point beacons. A landfall light is shown from a mast, 121m high, standing 6 miles SW of Braamspunt.

Three red lights, disposed vertically, are also shown from this mast.

Pilotage.—Pilotage is compulsory for vessels greater than 50 grt. A pilot should be requested through the port radio station at Paramaribo to the Harbormaster, giving 48 and 24 hours notice of ETA and the vessel's draft. The ETA should be confirmed or amended 6 hours prior to arrival.

Pilots are dispatched upon receipt of the 6 hour arrival message and board at the beginning of the channel S of the sea buoy.

Anchorage.—Vessels awaiting a berth can anchor in depths from 5 to 10m; avoiding a submarine power cable laid across the river from **Hoek van Meerzorg** (5°49'N., 55°09'W.).

Anchorage, if waiting for a pilot, can also be obtained 8 miles NW of Braamspunt, in a depth of 4.6m.

Suriname River above Paramaribo

1.19 The Saramacca Kanaal is entered just S of Paramaribo and can accommodate small craft and barges not exceeding 1.8m in draft and 24.3m in length. The canal joins the Suriname Rivier with the Saramacca River.

A lighted beacon is located abreast of Waterland, Saramacca Rivier. Nickerie can be reached by way of the Saramacca, Coppename, and Nickerie Rivers about 14 miles upriver from Paramaribo. It is recommended to pass N of the beacon.

Smalkalden (5°38'N., 5°05'W.) is a small bauxite loading terminal 18 miles upriver from Paramaribo. There is a wharf 67m long with 163m between the moorings and a depth of 9m alongside. It has been reported that the depth alongside the pier

is only 7.5m and that the largest vessel that can be accommodated is 180m long with a draft of 6.7m.

It has been reported (1996) that the port is closed to commercial operations.

1.20 Paranam (5°37'N., 55°05'W.) ([World Port Index No. 12415](#)) lies on the W bank of the river, about 1 mile above Smalkalden. Vessels up to 44,500 dwt load to outer bar draft, usually half a ship load. Vessels usually top off at Trinidad.

The least depth at loading berths is 9m. The minimum depth on the bar is 6.4m at LWS and 7.3m at HWS. The concrete pier is 107m long, with 1m between the moorings. The main commodity handled here is bauxite. There is also a 207m long alumina pier, with an alongside depth of 9m.

At Paranam the river is wide enough for ships to turn. A cable with a clearance of 60m spans the river close upstream of the port. Ships can anchor upstream of Paranam directly after the first bend.

Pilotage is compulsory for transiting the river.

Commewijne Rivier

1.21 The Commewijne Rivier flows into the Suriname Rivier on its E side about 6 miles above its mouth. The banks of the river are wooded and steep-to, with its bottom consisting mostly of clay and mud. The river has many sharp bends and tugs are needed to assist ships in making these turns. The tidal influence extends as far as Moengo, a distance of about 81 miles above the river mouth. The tides at Moengo rise about 0.1m.

The channel in the Commewijne Rivier from its junction with the Suriname Rivier to Alkamar, about 6 miles upriver, has a least depth of 5.2m. It was reported that ships 160m long with drafts up to 6.8m can reach Moengo via the Commewijne Rivier for 17 miles, the Cottica Rivier for 53 miles, and the Boven Cottica for 11 miles.

Pilotage.—Pilotage is compulsory. The river pilot will board the vessel off Neiuw Amsterdam. Navigation of the Commewijne Rivier is not permitted at night.

Anchorage.—Vessels anchor at Alkmar and in the turning basin at Moengo.

Moengo (Albina) (5°38'N., 54°25'W.) ([World Port Index No. 12420](#)) is a bauxite port on the E bank of the Boven Cottica.

There are two piers, one 131m long and the other 37m long, both with a depth of 7.3m alongside. Vessels are loaded in accordance with the bar draft of the Suriname Rivier.

1.22 From the mouth of the Suriname Rivier the coast trends to the E for about 75 miles, to the mouth of the Maroni River. The coastline is low and fronted with mudflats, with the 5.5m curve extending as far as 12 miles offshore.

Kaimans Hoofd (Kaimanshoofd) (5°50'N., 54°02'W.), about 6 miles NW of the W entrance point of the Maroni River, can be identified by a clump of high trees. Depths of less than 5.5m have been reported to lie as far as 15 miles off Kaaimans Hoofd and many dangerous wrecks are reported to lie off the coast. Deep drafted vessels should give this point a wide berth.

French Guiana

1.23 The coast of French Guiana between the Maroni River, the W boundary, and Fleuve Oyapock, the E boundary, 170 miles SE of the Maroni River, is generally low and is seen as a dark line of mangroves. A number of hills rise in the background and can be seen for some distance offshore. The coastal bank extends a considerable distance offshore.

The coastal bank lies as far as 21 miles offshore. Vessels should proceed with caution as the coastal reef has been reported to extend from 1 to 9 miles farther offshore than charted.

Rocket launchings are made from **Kaurow Space Center** (5°09'N., 52°39'W.) at intermittent announced times with impact areas as follows:

1. Area No. 1.—Area is bounded by the parallel 6°30'N, and the meridian 52°00'W, to 52°30'N, 50°00'W, then in a 235° direction, the coast of French Guiana, and the meridian 53°00'W.
2. Area No. 2.—A circle of 120 miles radius centered in 6°16.7'N, 51°42.2'W, limited SW by a line oriented 120° passing through 5°12.5'N, 52°43.7'W.
3. Area No. 3.—A circle of 100 miles radius centered in 8°05.5'N, 49°49.8'W.

1.24 The **Maroni River** (5°45'N., 54°00'W.) is entered between Galibi (Hoek Galibi), lying 5.5 miles SSE of Kaimaans Hoofd, and Pointe Francaise, 2 miles E of Galibi.

Ships with drafts of 4.5m can navigate up river for 15 miles to Alpine, situated on the Suriname side of the river, and to Saint Laurent, across the river on the French Guiana side.

In 1994, the least depth in the channel as far as Saint-Laurent du Maroni was reported to be 2.2m.

At the river entrance, the spring rise is 2.6m and the neaps rise is 2.0m. The tidal range at Saint Laurent is from 1.8 to 3.0m; HW occurs 3 hours later than at the entrance.

On the bar the flood current sets SW and the ebb sets toward Tiger Banken, a drying bank extending N from Hoek Galibi.

In the fairway abreast Tiger Banken, the river current can attain a speed of 3 knots.

The seaward edge of the bar lies 6 miles NNE of the river mouth.

In 1996, an entrance channel over the bar was reported to have a minimum depth of 1.5m.

The bar consists of hard coarse sand. A fairly heavy swell is usually experienced on the outer part of the bar.

A lighted sea buoy is moored 10 miles NE of the disused lighthouse on Hoek Galibi. Numerous wrecks, dangerous to navigation, lie off the entrance and can best be seen on the chart. The buoyed channel is subject to frequent change. The disused lighthouse on Hoek Galibi, a 60m high red and black metal framework tower, is an excellent landmark. From offshore, the river entrance appears as an opening in the line of trees between Hoek Galibi and Pointe Francaise.

Pilotage.—Pilotage is compulsory. Requests for a pilot, stating the vessel's draft, should be made 48 hours in advance to the pilot station at Degrad des Cannes. The pilot boards near Lighted Buoy SL. Pilotage is available during daylight hours only.

Anchorage.—Sheltered anchorage can be taken about 0.5 mile N of **Pointe Panato** (5°43'N., 53°58'W.), about 2 miles SSW of Pointe Francaise, in 7 to 8m, mud.

1.25 **Saint Laurent** (5°30'N., 54°02'W.) ([World Port Index No. 12450](#)) has two 120m piers with a depth of 4.5m alongside. Vessels will lie aground at LW on a soft mud bottom. Vessels are moored during daylight hours only.

Fleuve Mana (5°45'N., 53°55'W.) is entered between Pointe Francaise and Pointe Isere, 2.75 miles ENE. The mouth of the river is not visible from offshore. Pointe Isere is fringed by a shallow sandspit which extends W toward the river mouth.

The coast S of Pointe Isere and E of Pointe Francaise is also fringed by a shallow sandspit which extends N and E toward the river mouth. The river mouth narrows to less than 0.5 mile in width between the sandspits.

The depths in the entrance range from 0.3 to 1.2m. Vessels should not cross the bar within 2 hours of either side of low tide. Vessels should also avoid the S bank of the river as it is encumbered by tree trunks which are immersed at HW and are dangerous. Local knowledge is essential.

The settlement of Mana lies on the W bank of the river about 11 miles above its mouth. It has a landing stage with 5.8m alongside. A radio mast, which gives an excellent radar return, is located on the N edge of the village.

1.26 From Pointe Isere to **Pointe Charlotte** (5°12'N., 52°38'W.), about 80 miles to the SE, the coast is low and covered with mangroves.

Montagne du Diable, a prominent conical hill about 16 miles W of Pointe Charlotte, can be seen for a distance of about 20 miles. Riviere Organabo, Riviere Iracoubo, Riviere Counamana, and Fleuve Sinnamary, all of which are shallow, discharge into the sea along this part of the coast.

Depths of less than 5.5m lie from 4 to 9 miles offshore, but off the mouth of the Fleuve Sinnamary these depths lie as far as 11 miles offshore, therefore, give a wide berth off the coast.

A number of wrecks lie within the 20m curve off this section of coast and can best be seen on the area chart. A bank, with a least depth of 3.2m lies about 10 miles NNE of the W entrance point of Riviere Iracoubo.

Iles du Salut

1.27 **Iles du Salut** (5°17'N., 52°35'W.), three in number, are located about 7 miles NE of Pointe Charlotte. Ile du Diable, the N most, is 40m high. Ile Royale, 66m high, is the largest and W most, while Ile Saint-Joseph is the S most and only 30m high.

Ile du Diable and most of Ile Saint-Joseph are covered with high and dense vegetation. Buildings of a former prison stand on Ile Royale and Ile Saint-Joseph. On a clear day, the islands are visible at a distance of 15 miles.

The current sets generally NW. A SW current, with rates from 1 to 3 knots, and more during NE winds passes between Ile Royale and Ile Saint-Joseph, then becomes WSW and weakens S of Ile Royale. Within 91m of the S side of Ile Royale, there is a weak E countercurrent.

The flood tide flows WNW at 0.3 knot, 1 mile S of the islands, while the ebb tide flows NNW at 1 knot. Breakers mark the shallow depths which extend NE from Ile du Diable and ENE of Ile Saint-Joseph. It is difficult to approach Ile du Diable, except at the pier on its S end, and in good weather only. The passages between the islands are dangerous and are not recommended for even small boats. A heavy sea is often experienced during the wet season, from December to June.

A light is shown from the W side of Ile Royale and also the S and SE end of the island.

Anchorage.—The anchorage at Iles du Salut is the most important anchorage along the coast of the Guianas, this being due to the few ports along this coast capable of affording shelter to ships of moderate size.

Anchorage can be taken in the bight formed by the S side of Ile Royale and the W side of Ile Saint-Joseph. Depending on draft, vessels can anchor with the light on the W side of Ile Royale bearing 020°, distance 0.5 mile, in depths of about 9m soft mud, good shelter from the swell, and good holding ground. Depths less than those charted were reported between positions 0.5 mile WSW and 1 mile SSE of the light on the W side of Ile Royale.

Caution.—Alouette Bank, covered with 4.8m of water, lies about 1.7 miles NNW of Ile Royale. Depths of 3.5 to 5.5m lie between Ile Royale and this bank. An isolated 6.1m shoal lies 0.5 mile W of Ile Royale.

1.28 The mouth of the **Fleuve Kourou** (5°10'N., 52°37'W.) lies 3 miles SE of Pointe Charlotte. The river is narrow and entry is difficult as the channel leads near many dangerous rocks, the positions of which are uncertain.

High water is about 50 minutes later and LW about 30 minutes earlier than the time for Iles du Salut. Between Iles du Salut and the mouth of the river, the flood current sets SW and the ebb current sets NW.

The bar of soft sand, which shifts continually, permits the passage of ships with a draft equal to the height of the tide plus about 0.1m. The sea breaks on the bar in bad weather.

A lighted sea buoy is moored about 3.7 miles SSW of Ile Royale Light.

The entrance channel to the river is marked by buoys, and extends to the port of Pariacabo, about 3 miles W of the river mouth, on the N bank.

It was reported (1995) that the least depth in the channel as far as Pariacabo was 2.5m.

Pilotage.—Pilotage is compulsory and is available during daylight hours only. A 36 hour advance notice is required. Pilots board ship in the vicinity of the sea buoy. Ships awaiting a berth can anchor N of the sea buoy or S of Iles du Salut.

1.29 Pariacabo (5°08'N., 52°39'W.) is the port for the Space Center at Kourou. There is a pier about 105m long, with a depth of 3.6m alongside, with a mooring buoy off each end of the pier. Recently, the pier was reported unusable.

The village of Kourou lies about 1 mile above the mouth of the river and buildings in the village are prominent from seaward.

From the mouth of the Fleuve Kourou, the coast trends to the SE for about 21 miles to the mouth of the Riviere de Cayenne.

The coast is wooded and marked by a few slightly salient points, but the coast has not been fully examined.

Several rocks and small island lie as far as 5 miles offshore. Monts La Condamine, wooded with steep slopes, lies about 6 miles SSE of Pointe Charlotte, and can be seen from the offshore. The summit of the mountain is prominent.

Riviere de Cayenne

1.30 The river is entered W of the NW end of **Ile de Cayenne** (4°56'N., 52°20'W.). Ile de Cayenne is hilly and irregular, especially in the E part and is easily identified from seaward.

The depths over the bar are subject to frequent changes. Depths over the bar vary from 0.3 to 0.7m at LW. It is recommended that mariners receive the latest depth information from the pilots before crossing the bar. It has been reported that a vessel with a draft of 4.2m could cross the bar at mean HW.

Banc du Macouria, a large sandbank which dries in places, fronts the N side of Pointe de Macouria, the W entrance point of Riviere de Cayenne.

Several rocks, above and below-water, and Iles Remire, a group of five small islands, lie as far as 5 miles off the N and E sides of Ile de Cayenne.

L'Enfant Perdu (5°02'N., 52°21'W.) is a low flat rock, located about 6 miles N of the river mouth, and shows a light.

A lighted buoy is moored about 0.5 mile N of the rock. A reef extends about 0.1 mile E and W and 14m to the S, respectively, from the rock.

A dangerous wreck lies 0.5 mile to the E of the rock. Heavy seas have been experienced in this vicinity.

An isolated 5.9m shoal is reported to lie about 2 miles NNE of the rock.

Tides—Currents.—The mean tidal range at Cayenne is about 2.3m at springs and about 1.2m at neaps.

The current about 10 miles offshore usually sets between WNW and NW, and attains a wind-assisted velocity of 2 to 3 knots. The offshore current is affected by the tidal current as far out as L'Enfant Perdu where the flood current sets NW and the ebb NNE at rates of up to 2 knots.

Off the mouth of Riviere de Cayenne, the flood current sets slightly towards Banc du Macouria, especially during SE winds. The ebb current sets E towards the banks extending N from Ile de Cayenne.

Within the river the currents follow the channel. The ebb current attains a rate of up to 4 knots while the flood current does not exceed a rate of more than 2.5 knots.

Aspect.—Ile Cayenne is composed of several hills and prominent mountains, with Mont Montabo, 105m high, at its N end. A water tower, marked by lights, stands about 2 miles S of Mont Montabo. A conspicuous hotel is also located near Mont Montabo.

Pilotage.—Pilotage is compulsory and is available 24 hours. Send ETA and draft 48 hours in advance to the pilot station at Degrad des Cannes.

Contact the pilot vessel 1 hour before arrival on VHF channel 16; the pilot boards near Lighted Buoy CA.

Anchorage.—The only anchorage for vessels unable to cross the bar is at Ile du Salut. Vessels awaiting pilot or tide,

anchor in 6m about 3 miles NE of L'Enfant Perdu. The bottom is mostly mud, good holding ground.

1.31 Cayenne (4°56'N., 52°20'W.) is situated at the NW extremity of Ile de Cayenne on the E bank of the river mouth.

The port is closed to commercial traffic and is now used mainly by fishing vessels.

Larivot (4°54'N., 52°22'W.) ([World Port Index No. 12460](#)) about 2.2 miles upriver from Cayenne, is a small tanker port and consists of an L-shaped pier, having a length of 100m along its outer face. The port can accommodate ships with drafts of about 4.8m. A rock with a depth of 1.5m lies close W of the pier.

It was reported (1995) that the minimum depth in the channel as far as Larivot is equal to the height of the tide at Cayenne.

1.32 The Fleuve Mahury (4°52'N., 52°14'W.) flows into the sea between Point Diamonte, the E most point of Ile de Cayenne and a mud flat extending NNE from Pointe Jaguar, 1.5 miles further SE.

The winds are predominately from between N and E from January to April and between E and SE from April to December.

The tidal current in the river is 1.8 knots during the flood and 2 knots during the ebb, but the currents have been known to attain rates of up to 4 knots.

A 91m wide channel leads from a position 1.25 miles E of **Le Pere** (4°56'N., 52°12'W.) in a SSW direction for 6 miles over the bar into Fleuve Mahury and then turns W to Degrad des Cannes. It has been dredged to 5m, but it was reported (1994) that silting had reduced the channel width to 80m and channel depths to 3.4m.

There is an occasional swell over the bar, but the bottom is soft mud, allowing ships to plow through. The entrance, marked by a lighted buoy, is located about 5 miles NE of Pointe Diamant.

The channel is marked by buoys and leads to the port of Degrad des Cannes, about 8 miles from the entrance buoy.

1.33 Degrad des Cannes (4°51'N., 52°16'W.) ([World Port Index No. 12455](#)), the port of French Guiana, opened in 1972. The principal wharf is 371m long, with a maintained depth of 6m. Abreast the wharf is a turning basin, best seen on the chart, that also has a maintained depth of 6m. The port of Degrad des Cannes replaces the port of Cayenne to which it is connected by road. Vessels up to 160m and a draft of 5.9m can be accommodated. The tidal currents may attain a rate of 4 knots.

Pilotage is compulsory and the pilot boards in the vicinity of Lighted Buoy DC. Pilot must be requested 48 hours in advance. The vessel's draft should also be included in the request for a pilot. Vessels should be at the pilot station 2 hours before HW.

The Riviere Oyac joins the Fleuve Mahury about 14 miles above Pointe Diamant. Ships proceed up the Oyac as far as the mouth of the Riviera Orapu, about 6 miles above the mouth of the Oyac, and then 4 miles up the Orapu to the settlement of Fourgassie, a timber loading port.

At Fourgassie, ships must be prepared to push the bow into the bank of the river in order to turn around, as the river is only

90m wide. The least depth on the passage up to Fourgassie is 4.3m. Ships are warped to the loading place as close as their drafts will allow.

Rivieres Oyac and Orapu are only marked with buoys at a few dangerous places, and both banks of these rivers are thickly overgrown with trees.

From the mouth of the Fleuve Mahury the coast trends SE for about 50 miles to the mouth of the Fleuve Oyapock, the boundary between French Guiana and Brazil.

The coast is low and swampy between Fleuve Mahury and Fleuve Approuague, about 25 miles SE. The coast between Fleuve Approuague and Fleuve Oyapock is low and wooded.

Prominent hilltops can be seen in the background from offshore. Mudflats of shallow depths from the coast lie as far as 10 miles offshore. Mariners are advised to give this part of the coast a wide berth.

1.34 Le Petit Connetable (4°48'N., 51°58'W.) lies about 12 miles N of the mouth of the Fleuve Approuague. The island is flat, blackish in color and is barely awash at HW.

Le Grand Connetable, a bare rock about 50m high, lies about 2 miles E of Le Petit Connetable and can be seen at a distance of 25 miles in clear weather. Its SW side is steep-to and its E side appears to extend underwater for some distance.

Ships should not pass between Le Petit Connetable and Le Grand Connetable.

Battures du Connetable (Les Battures de Connetable) (4°56'N., 51°57'W.), lying about 6 miles NNW of Le Grand Connetable, are rocky plateaus of coral and sand with a least depth of 1.8m. During swells the sea breaks on these shoals, but during calm weather it is only marked by the eddies of a W current. Banc Cospatrick (Haut-fond Cospatrick), 1.5 miles NNW of Les Battures, with a least depth of 4m, is the summit of a bank of soft mud.

Tides—Currents.—The main current is strong and sets to the NW in the vicinity of the Connetables during the summer, but during the winter, especially on the falling tide at springs, this current runs farther offshore.

The tidal current, the strength of which is augmented by the discharge of Fleuve Approuague, sets N and NNW and causes heavy breakers at its meeting with the main current about 3 or 4 miles outside the Connetables. This race usually disappears at SW if the outer current is weak. The inner edge of the race appears as breakers on a shoal and on its landward side the water is muddy.

Caution.—A dangerous wreck lies about 5 miles WNW of Le Petit Connetable.

Fleuve Approuague

1.35 This river discharges between **Pointe Behague** (4°40'N., 51°54'W.) and the coast about 6 miles W. It is identified by its width and by Pointe Behague, which is covered with mangroves. A drying mudflat extends from the W entrance point of the river to a position 7 miles NW of Pointe Behague.

The river is navigable for about 10 miles from its mouth, but small craft can proceed to Regina, about 30 miles upriver. The

channel in the river, with a depth of 5m at HW, follows the E bank as far as Guizambourg, a small village about 10 miles from the river mouth. Above the village the channel becomes narrow and winding and often leads close to dangerous rocks and shallow sandbanks.

Caution.—A dangerous wreck lies about 8 miles NE of Pointe Behague.

Fleuve Oyapock

1.36 The river forms the boundary between French Guiana and Brazil, and discharges between **Mont d'Argent** (4°21'N., 51°39'W.) and Cabo Orange, about 10 miles E.

The river is navigable for ships drawing up to 4.0m at HWS, as far as Saint Georges, about 30 miles above the river mouth. Off the river mouth the flood current sets WNW and the ebb current sets NE, attaining a rate of up to 3 knots. The current offshore sets NNW and attains a rate of up to 2 knots.

Baia do Oiapoque (Baie d'Oyapock), which forms the mouth of the river, is 8 miles wide between Mont d'Argent, its W entrance point, and Cabo Orange, its E entrance point. The estuary of the river is encumbered with numerous shoals on which the sea breaks heavily in bad weather.

The river has not been completely surveyed and its navigation is dangerous. In the vicinity of Mont d'Argent the coast is backed by several hills, which are visible from offshore. Mont d'Argent can be seen for a distance of about 15 miles on a clear day.

The anchorage normally used lies about 1 mile E of the SE point of Mont d'Argent, in depths of 4.9m mud bottom, being aware of the rocks that extend almost 1 mile SSE of the point.

Also, during bad weather the currents are strong and the sea rough.

Ships drawing less than 3m can anchor off the Riviere Ouanyary, between about 0.1 mile and 0.15 mile from the foot of Mont Bruyere.

There are no official pilots available, but persons having local knowledge can be obtained at Cayenne or Belem, Brazil.

Cabo Orange to Cabo Norte

1.37 The N coast of Brazil, except for a few stretches of Estado do Caera near its E part, is low and is formed of sandhills about 49 to 79m high. The sandhills are similar in appearance, being interspersed with reddish cliffs and clumps of mangroves. The mangroves are usually observed at the mouths on the W banks of the rivers, which they serve to mark.

The entrances of the rivers along this coast are as a rule open to the N and are obstructed by sandbanks. Many of the rivers are gradually silting up and will omit only small coasters.

Ships can anchor along the N coast in good weather but the sea becomes rough at times during flood tides.

Cabo Orange (4°28'N., 51°29'W.), the N extremity of the Brazilian coast, is low, but its salient position is easily identified from eastward as the hills on the W side of Fleuve Oyapock are visible behind it. The vegetation covering the N part of the cape is higher than at its S part and can be seen from a distance of about 12 miles. The cape should not be approached within a distance of 11 miles. The cape is marked by a light.

1.38 The coast from Cabo Orange to Cabo Norte, about 195 miles to the SSE, is low and covered with tropical vegetation which can be seen for about 12 miles. Several rivers flow into the sea along this part of the coast. The action of these river, combined with the Amazon River, cause frequent changes in the coastline. The silt carried out by these rivers forms soft mudflats which extend a considerable distance offshore in places. Mangroves spread rapidly during the dry seas over the mudflats but are destroyed during the rainy season.

The coastal bank contains all known dangers, and lies as far as 70 miles offshore. Mariners should not approach this coast in depths of less than 18.3m as strong winds cause heavy rollers over the coastal bank.

A depth of 16.5m was reported to lie outside the 330m curve in approximate position 3°18'N, 48°09'W.

The coast between Cabo Orange and Cabo Cassipore 20 miles SE, is low, subject to flooding, and is only visible about 8 miles offshore. shallow bank fringes this coast and there are depths of less than 5m as much as 12 miles offshore.

Cabo Cassipore (3°54'N., 51°06'W.) is the extremity of a low promontory which forms the E entrance point of the Rio Cassipore. The river entrance, about 6 miles W of the cape, is wide and can be identified by the large trees on the W bank of the river which lie above the neighboring mangroves.

The river is navigable by small coasters drawing up to 2m as far as the town of Japa, 24 miles upstream. Small boats can reach Portel, 12 miles upriver from Japa.

1.39 Rio Cunani (2°49'N., 50°57'W.) is entered about 65 miles SSE of Cabo Cassipore and is navigable by vessels drawing less than 3m as far as the mouth of the river. The bar should not be crossed without the advice of local pilots or a pilot obtained from Belem, and only during the intervals when the water is above half tide.

The river can be identified by Monte Cunani, 50m high, located about 4 miles S of the river mouth, which can be seen for a distance of about 16 miles. The mount is covered by vegetation that stands out from the mangrove in the same vicinity. From the NE it appears as a narrow hill, from the SE it appears more elongated and less distinctive.

Anchorage may be obtained off the mouth of the river in a depth of 5m, good holding ground of mud. Vessels should use a good scope of chain due to the strong tidal currents. Vessels will roll heavily during the flood current.

Rio Calcoene (2°32'N., 50°45'E.) is located about 20 miles SSE of Rio Cunani, and shows a light from the S bank of the river mouth. The river is navigable to near the settlement of Daniel, 15 miles from the mouth, by vessels of up to 3m of draft. The mouth of the river is obstructed by drying sandbanks. The bar can be crossed with water level above half tide, with the advice of local pilots or pilots obtained from Belem.

Rio Amapa Grande (2°08'N., 50°41'W.), about 24 miles SSE of Rio Calcoene, is navigable by vessels drawing up to 3m for as far as Santa Cruz do Amapa about 6 miles from the river mouth, and close to the city of Amapa. The river bar can be crossed only with local knowledge or the help of pilots, and only when the water level is above half-tide.

An aeronautical light and a radiobeacon are located near Amapa.

1.40 Ilha de Maraca (2°05'N., 50°25'W.), divided into two parts by Igarape do Inferno, forms a bay which affords the only sheltered anchorage along this part of the coast. Cabo Raso do Norte, the NE extremity of the N part of the island, lies 28 miles SE of the mouth of the Rio Calcoene.

Canal do Varador de Maraca (Canal de Carapaporis), which separates the W side of island from the mainland, is fairly deep and is the main approach to the anchorage. Canal Turluri, on the S side of the island, is obstructed by a mudbank and is available only to vessels of shallow draft and local knowledge.

Small vessels should not navigate in Canal do Varador de Maraca and in the vicinity of Igarapedo Inferno just before the tidal bore occurs.

The best anchorage is with the NW extremity of the N part of the island bearing 338° and the S entrance point of Rio Amapa bearing 280°.

It is reported that depths are not less than 5.5m mud, and that the anchorage is sheltered from the tidal currents and the bore.

Greater depths are to be found farther off the island, but the tidal currents are so strong that an anchorage there would be untenable at springs.

A ship should approach the anchorage from the NNE, giving the N part of the island a berth of at least 4 miles. The W end of the N part of the island can be kept close aboard.

The anchorage is plainly indicated by the opening of Igarape do Inferno.

The tide reaches its highest level in Canal de Varador de Maraca about 2 to 3 hours after the beginning of the flood tide.

At the equinoxes, the tide has been observed to rise 10m and tidal currents to run for a short period at a rate of 7 knots. This rate rapidly diminishes within four days after springs. During these periods, there is a heavy sea offshore.

The difference between the level of LWS and neaps seldom exceeds 2.5m. The current always sets NW.

Ilha Jipioca (1°51'N., 50°13'W.) lies about 2 miles N of the S entrance point off Canal Turluri, and is inaccessible as it is surrounded by shallow mudbanks.

1.41 Cabo Norte (1°41'N., 49°55'W.), the NW limit of the estuary of the Amazon River, lies 47 miles SE of Cabo Raso do Norte and 19 miles from Ilha Jipioca. The cape is low, wooded, and slightly higher than the neighboring coast.

The coastal bank, with depths of less than 10m extends nearly 60 miles NE of Cabo Norte. Depths of less than 5m extend 47 miles NE of the cape. This bank is dangerous during strong winds which cause heavy rollers over it. Vessels should not approach it within depths of 20m. Shoals with depths of 10.3m and 16.6m, have been reported, lie about 145 miles NE of Cabo Norte. A shoal with a depth of 11m, lies about 10 miles SW of that position.

Several shoals with depths from 3.7 to 6.1m up to 25 miles offshore between ENE and SE from Cabo Norte.

Lower Reaches of the Amazon River

1.42 The mouth of the Amazon River, together with the mouth of the Rio Para, extends from Cabo Norte to **Ponta**

Curuca (0°32'S., 47°49'W.), 183 miles to the SE. Canal do Norte and Canal do Sul, through which the two main arms of the Amazon River flow into the sea, encompass a number of islets and islands.

Ilha do Marajo, the largest in the estuary, forms the S side of Canal do Sul and the W bank of Rio Para from its entrance for several miles.

These two rivers are connected by a number of navigable channels.

A characteristic of the Amazon River is that it has no delta of accumulated mud extending into the sea, yet the river carries an immense amount of mud in its waters.

The Amazon River and its tributaries comprise over 13,700 miles of safe river navigation. Manaus, situated more than 900 miles from the sea, can be reached by ships drawing 7.3m all year. Iquitos, Peru, nearly 2,000 miles from the sea, can be reached by ships drawing 3.6m the year round and by ships drawing 7m during HW which occurs from January to May.

Sao Antonio on Rio Madeira, the principal tributary of the Amazon River, can be reached by ships drawing 5.5m for about 9 months of the year.

During the remainder of the year only 1.9m drafts can be taken.

Sao Antonio is nearly 1,535 miles from the sea and is situated about 697 miles up the Rio Madeira from its junction with the Amazon River, about 82 miles below Manaus.

Boats and barges can be navigated most of the year between Ciudad Bolivar, Venezuela and Manaus via the Rio Orinoco and Amazon River systems.

Winds—Weather.—In the vicinity of the Amazon River the air is cooled by the proximity of the watercourses and lakes coupled with the heavy and frequent rains which are accompanied often with squalls. The difference between the day and night temperatures is appreciable during the latter part of the year.

The year has two seasons, winter or the rainy season and summer or the dry season. The rainy season is between January and June and the dry season is between July and December. During winter the rain falls in torrents sometimes for an entire week.

The level of the river and its tributaries begins to rise from the start of the rainy season and soon the rivers are joined, with large lakes which form close to their banks. As the water level rises, trees are uprooted from islands.

At these times the waters of the rivers near the lakes have an unpleasant taste and are dangerous to the health.

The winds blow between ENE and ESE during the dry season and they are considered to be the prevailing winds. These winds are moderate in July and August but fresh during the rest of the season when the gusts, known locally as "Marajos" reach great force.

This season is the best time for ascending the river. Sailboats descending the river drift with the current, all sails furled.

During the rainy season calms prevail, interrupted only by heavy squalls from the NE which backs through N to SW accompanied by torrential rains.

Tides—Currents.—The waters of the Amazon River increase in volume during 6 months of the year and decrease during the other part of the year. The snow on the Andes begins to melt during August and September, but this influence is

slowly felt by the river. The river begins to rise in November and the flooding in the lower parts take place from January to May. The NE winds, which then prevail blow strongly at the river mouth, delay the discharge of the river and contribute greatly to the inundations.

The maximum rise of the river level varies from 9 to 15m leaving at times the entire basin flooded. As a result of natural causes, the water in the S tributaries of the Amazon River is high, while that of the N tributaries is low, and vice versa. In Rio Madeira, a S tributary, the water attains maximum height in April, the difference between H and LW being about 15m.

Outside the river estuary, the ocean waters which are driven W by the prevailing winds form a NW current which usually attains rates of 2 to 4 knots. This current being at right angles to the current from the Amazon River deflects towards the N and joins with the river current, attaining greater force.

The muddy water of the river discolors the ocean waters for about 70 miles from its mouth. Its limits are well-defined by the abrupt change of color. A vessel outside the line of demarcation, where the ocean water is of a bluish-green color, has been observed to leave a wake of muddy water, in sharp contrast with the surface water.

This phenomenon occurs in depths of up to 15m and is caused by the lower layer of river water extending further seaward than the surface layer.

The tides in the vicinity of the Amazon River are subject to so many variations and irregularities that it is difficult to state precisely what course they follow. Duration, height, and strength of the current depend on the force of the wind, the volume of rain, and the random changes in current direction.

The flood current near the mouth of the Amazon River (between Cabo Norte and the mouth of the Rio Para) sets to the SSW and then sets toward the SW and WSW accordingly as it moves out from the coast, whereas the ebb current sets originally to the general current.

There are irregularities in the tides along this part of the coast. One of the more remarkable irregularities is a difference of 2 or 3 hours in the times of HW of two places in the estuary only 12 miles apart. Another remarkable anomaly is a rise of only 1.9m, 12 miles from a position where at the preceding tide 8.8m high had been observed.

During the rainy season near Ilha do Marajo, the water level rises quickly as soon as the flood tide begins. The spring rise is usually about 5m, half of this rise occurs during the first two hours of flood tide and the rate of the current is about 6 knots.

The rate of current between Cabo do Norte and the mouth of Rio Araguari, about 25 miles S, varies from 8 to 10 knots.

At Cabo do Norte from January to April, the flood current attains a rate of 8 knots at springs, and the ebb current attains rates of from 2 to 4 knots. In May the currents are of equal strength and after May the ebb current begins to be the stronger of the two. In August and September the flood current is weak while the ebb current attains rates of 5 to 6 knots. In October the ebb current begins to decrease in strength and during November, the period at which the NE winds begin to blow, both currents are again of equal strength.

From this it may be concluded that the sea level is higher than the river level when the flood current is stronger than the ebb current. This occurs from December to April, a period when the winds blow strongly from the NE. The sea level is

lower or at least equal to the river level when the ebb current is stronger than the flood current. This occurs from June to October, a period when the winds blow from the ESE.

In December, when the flood current begins to be stronger than the ebb current, this effect is felt as far as 120 miles above the river mouth. Normally, the influence of the tide is felt as far as Obidos, situated about 600 miles above the river mouth.

The tidal bore phenomenon, known locally as Pororoca, occurs at times in the Amazon estuary prior to spring tides. The bore consists of a wave which varies from 1.5 to 2.5m high whose crest breaks and spreads over the shallow waters of the river and its tributaries. The phenomenon is not felt in depths of more than 7m so that there is no danger to ships keeping within the main or deep channels.

The wave has a velocity of 10 to 15 knots being strongest and most dangerous from January to June, and at the equinoxes, when the wind is from the NE. It carries off everything in its course. When the wave passes, it leaves the river almost full. Afterwards, the flood current continues to attain rates of 8 to 10 knots in the vicinity of Cabo do Norte from January to April and less in August and September.

Without perceptibly raising the level of the water near Cabo do Norte, the tide reaches its greatest height, reported as 12.2m within a period of about 10 minutes. However, off Ilha do Marajo the bore only causes the water to reach mean level, the tide reaching maximum level with the continuation of the flood.

The bore, which is felt as far as 40 miles up the Rio Araguari, is very violent.

There is no bore in Rio Para but in Rio Guama, a tributary of Rio Para, a bore is experienced at spring near the town of Pernambuco, situated about 25 miles above Belem. This bore raises the level of the water from 1.5 to 4.5m within a few minutes. A similar experience occurs in Rio Guajara, another tributary of Rio Para whose mouth lies close S of Belem.

When the bore occurs, which is at the lowest tide, a roaring sound is heard at a distance of 3 to 6 miles. This noise increases in intensity as the bore approaches.

Barra Norte (North Bar)

1.43 This bar is located on the approaches to Canal do Norte and is formed on its W side by the mainland and by various islands along the coast between Cabo do Norte and Ponta do Ceu and on its S side by the N edge of Banco Santa Rosa which extends N and E from Ilha Janaucu and Ilha Caviana (Ilha Caviana de Dentro). Ponta do Ceu, the SE extremity of Ilha Curua lies about 56 miles SSW of Cabo do Norte. The bar is composed of sand and mud.

The land which borders the bar is low and marshy and is covered almost entirely with tall vegetation. At the edge of some islands this vegetation appears like trees, typical of marshy regions.

This part of the coast is visible at a distance of about 13 miles from a height of 7m but this distance may be increased by refraction. Refractory effects are common in this area, especially in the afternoon.

Shoals in the N part of the bar present a most varied appearance when not above the water. There are times when no

difference is perceptible to the eye between these shoals and the channels.

At other times, the dark shadows of the shoals are clearly defined at the sides of the channels. However, the opposite may occur when the channels become darker and the water over the shoals appears clearer. There are also times when there are slight breakers over the shoals and calm water in the channels as opposed to times when there is broken water in the channels and calm water over the shoals.

These shoals in general lie in a NE and SW direction forming long and narrow ridges and parallel the trend of the channels. The NW and SE edges of these shoals are reported steep-to. The bottom throughout this area consists of mud and sand.

Liha do Paara Light is shown from a square framework tower 30m in height, 7 miles SSW of Ilha do Bailique Light. A racon is transmitted from the light.

The least depth in the approach from NE over the bar is about 9.2m.

The bar is obstructed by numerous low islands and shoals, some of which dry at LW. There are deep but narrow channels between them, with strong currents attaining rates of almost 8 knots.

1.44 Banco de Meio Norte (1°02'N., 49°45'W.), with a least depth of 2.7m lies 12 miles ENE of **Ilho do Bailique Lighthouse** (00°59'N., 49°57'W.).

Banco Madureira, lying 8 miles E of the same light, dries to 0.3m. A large part of this shoal breaks at LW.

Banco do Meio and Banco da Barra are extremely hazardous to navigation because their sides are steep-to along most of their entire length and they are difficult to distinguish. Banco do Meio, extending from a point 9.5 miles ESE of the Ilha do Bailique lighthouse to a point 8 miles SE of the same light, has a least depth of 5.3m. Banco do Barra, close SW of Banco do Meio, has a least depth of 0.6m and breaks at LW.

The waters E of Banco Rio Bronco, an extensive bank with a least depth of 0.6m, lying close E of Banco da Barra, are dangerous. They are not buoyed, and they are entirely unfamiliar even to local pilots. All ships should avoid these waters completely.

The E side of the recommended fairway through the bar is bounded by Banco de Meio Norte, Banco de Meio, and Banco da Barra. The W side of this fairway is bounded by Banco do Tabaco Bom, Banco do Para, and Banco do Areiao. This fairway is Canal Grande do Curua.

Canal do Bailique lies between the shoals that form the W sides of the recommended fairway and the islands and the mainland W and dries completely.

Caution.—In the vicinity of Barra Norte, the banks and channels are subject to great changes; mariners should exercise extreme caution.

Canal do Norte

1.45 This channel, the approach through the N arm of the Amazon River, is entered between Ponta do Ceu and Ponta do Santarem, the N point of Ilha Janaucu. A light is shown from each point. The channel leads to the port of Macapa, a distance

of 75 miles. The land on both sides of the N arm is low and covered with tall vegetation, and is encumbered with several shoals, some of which uncover partially at LW.

A 3.1m shoal lies 6.5 miles ENE of Ponta de Santarem. Shoals with a least depth of 7m lie in the channel midway between Ponta do Ceu and Ponta de Santarem.

Vessels entering the N arm may do so without a pilot up to Macapa if drawing no more than 9.1m. If deeper they require a pilot who will board at **Salinopolis** (0°36'S., 47°21'W.).

Ponta do Capinal (00°37'N., 50°22'W.), lying 16 miles W of Ponta do Santarem, is the N end of Ilha Caviana. Drying banks extend 2.75 mile NE from this point, reducing the channel width to about 4 miles.

Ilhas Pedreira (00°20'N., 50°37'W.), a group of islands subject to change and marked by a light, lie in the center of the channel, about 25 miles SW of Ponta do Capinal. The islands are tree covered. Drying banks extend about 10 miles NE of the islands. The island divides the river into two channels. The E channel is the wider of the two and is preferred by the navigator, who should avoid the shallow depths of Banco Carolina, which is marked by a lighted buoy.

There are good anchorages off the Ilha Caviana anywhere between a point 5 miles SW of Ponta do Capinal and the mouth of the **Rio Arrozal** (00°17'N., 50°29'W.). A light is shown at the mouth of the river.

1.46 From **Ponta do Pau Cavado** (00°12'N., 50°48'W.), located 15 miles WSE of the Rio Arrozal, the NW shore curves W, then SSW for 20 miles to **Macapa** (00°02'N., 51°03'W.). There are no known dangers off this shore.

Mariners should be aware that safe transit of the Amazon River requires extensive local knowledge due to frequent changes of the banks and channels and lack of navigational aids.

To attain favorable tidal currents and maximum depths an inbound vessel with a draft greater than 8m should cross the bar 1 hour before local HW.

Although the least depth on the track in the approaches to Banco Norte and the river itself is usually 9 to 10m the river is constantly changing and charted depths are not to be relied upon.

It was reported that the maximum draft for ships using Canal do Norte was 11m but soundings should be taken frequently due to the changing depths and shoals.

Canal do Sul

1.47 The S arm of the Amazon Rivers should be approached through Canal do Sul, the entrance channel, which lies N of Ilha do Marajo and S of the SE part of Banco Santa Rosa, Ilha das Flechas, Ilha Mexiana, and Ilha Caviana de Fora.

From **Cabo Maguari** (00°17'N., 48°22'W.), the W entrance point of Rio Para, the N coast of Ilha Marajo trends westward for about 120 miles to Ponta Sao Joaquim, the NW point of the island. Canal do Sul is entered N of Ilha Machadoinho between Ilha Puampe, about 4 miles W of Cabo Maguari, and Ilha das Flechas.

The maximum recommended draft of ships using Canal do Sul is 8.2m.

Between Banco San Roque, a shallow bank extending 10 miles E of Cabo Maguari, and Ilha Puampe, lie several islets and islands of which Ilha Machadinho, marked by a light and lying about 17 miles WNW of Cabo Maguari, is the E most. Between these islets and islands and Ilha Marajo lies a winding channel which leads to the S arm of the river.

A light is shown from Cabo Maguari.

Ilha das Flechas lies close with the S edge of Banco Santa Rosa, which extends about 13 miles E from the islet. Banco Santa Rosa extends from the W side of Ilha das Flechas to the E side of Ilha Mexiana, about 20 miles W. This bank is shallowest about midway between the two islands. Its S limit is unknown.

Ilha Caviana de Fora and Ilha Mexiana form with Ilhas das Flechas and the bank extending E and W, the N limit of the S arm of the Amazon River. These islands are low and wooded, the N parts being flooded during heavy rains.

The channel off the S shores of Ilha Mexiana and Ilha Caviana de Fora is fairly deep and clear of dangers. A group of submerged rocks, the exact positions of which are doubtful, lie near the middle of the channel about 8 miles E of Chaves.

Chaves (00°10'S., 49°59'W.) is situated on the N shore of Ilha do Marajo opposite Ponta da Caridade, the S extremity of Ilha Caviana de Fora. Chaves is an important cattle exporting center.

The N and S arms of the Amazon River are connected by several channels that are formed by the many islets and islands lying off the NW side of Ilha de Marajo.

Vessels can continue W in the Canal do Sul to reach Macapa by using a channel that passes N of Ilha del Pacas and W of Arquipelago Jurupari.

The area is unsurveyed and subject to change. Vessels should not attempt this passage without local knowledge.

1.48 Macapa (00°02'N., 51°03'W.) ([World Port Index No. 12483](#)) stands on the NW shore of the river at a place where the land is relatively high. The chief export of the port is manganese ore. An old fort on a small promontory fronts the city.

A pier 260m long with a draft of 12m in first 200m and 8m in the remaining 60m.

Anchorage.—Vessels anchor about 0.5 mile E of the pierhead in 11 to 12.8m. Care is necessary to avoid a 7m rocky patch about 0.6 mile E of the old fort.

Ships drawing up to 3.6m can anchor about 183m off the pierhead. Care should be taken to avoid a 2.7m patch, 0.2 mile SE of the pierhead. This berth should be approached with the pierhead in range about 301° with a white building about 0.4 mile beyond it. Good holding ground, in 20m was reported about 1.75 miles E of the pierhead.

1.49 Porto de Santana (00°03'S., 51°11'W.) ([World Port Index No. 12485](#)) is located about 11 miles SW of Macapa on the N shore of the Canal de Santana. The port's main export is also manganese ore.

The port consists of a floating pier 247m long, with a least depth of 10.7m alongside, and a general cargo pier, about 86m long, with a depth of 8.8m alongside. Vessels can depart at any stage of the tide. Alongside the floating pier the tide runs for 60 minutes beyond the time computed from the table. In the

middle of the current, the delay in the change of current is 90 minutes, depending upon the river flow.

Pilotage.—Ships bound for Macapa and Porto de Santana via the N bar enter without pilots. Ships bound for either port should request the latest navigational information about this channel from the radio station at Belem.

Ships coming from Belem carry pilots who moor and unmoor at Porto de Santana and who pilot upriver. Pilotage is compulsory above Macapa.

Pilots will be flown from Belem to Porto de Santana, provided that prior arrangements have been made, where they board ships for upriver transits.

There are no pilots stationed at Porto de Santana for berthing operations. Past experience has shown that pilots are not required.

Ships neither use nor need a tug for docking or undocking but a small boat, equipped with an outboard motor, is used for receiving the first mooring line.

Ships berth starboard side-to the floating dock when the tide is ebbing and port side-to when the tide is flooding. It is preferable to berth with some current running. The slack tide period is short. In order to berth port side-to ships can turn around off the port between longitudes 51°11'W, and 51°12'W. Ships usually make the turn without the use of an anchor as the current helps the maneuver.

Ships can undock at any stage of the tide. A ship berthed upriver with the starboard side-to the dock can swing downriver off the dock with the aid of the tide and mooring lines.

Anchorage.—Canal de Santana provides good anchorage almost anywhere, over mud bottom. There is sheltered anchorage between the mainland and Ilha de Santana. Ships usually anchor in 46m about 0.2 mile offshore. The anchorage off the port has adequate room for 5 ships. Temporary anchorage, in a depth of 22m may be found about 2 miles ESE of the entrance to Canal de Santana.

Clearance to anchor off Porto de Santana must be requested from the port captain at Belem.

1.50 Munguba (00°55'S., 52°25'W.) is located 150 miles above Porto de Santana on Rio Jari, about 60 miles above the mouth.

The port consists of a 200m long pulp berth and a 180m long kaolin berth, each with a depth of 12m.

Pilotage is compulsory. The pilot boards at Porto de Santana, or, with 72 hours advance notice, at **Fazendinha** (00°04'S., 51°06'W.).

The navigation aids are reported unlit and movement is by day only.

The minimum depth of the river is ascertained by the pilot using a hand lead while the vessel is loading. The vessel is then informed of the maximum safe departure draft. This depends upon the time of year; during the rainy season a vessel can load to a fresh water draft of 9.3m.

Anchorage, in 12m mud, can be obtained E of the pulp berth.

Rio Para

1.51 The mouth of the Rio Para lies between Cabo Maguari and Ponta Curuca, about 38 miles to the ESE. The

land on both sides of the river is low and cannot be seen from the bar. The river water is muddy for a good distance out to sea.

The banks and shoals within Rio Para are constantly changing. Banks that formerly never reached water level have now developed into small islands covered with vegetation due to the accumulation of debris which has been carried down by the river currents. Other islands have been washed away.

Navigation within the river should be undertaken with extreme care and soundings should be taken frequently because of uncharted shoals.

It is also possible that depths of charted shoals may be less than charted.

Pilotage.—Rio Para pilots, from Salinopolis pilot station, board vessels, as follows:

1. Vessels with a draft of 8m and over—7.5 miles NNW of Salinopolis Light.
2. Vessels with a draft of less than 8m—1°06.0'S, 48°29.6'W.

The pilot boat has a red hull and a mast from which a red flag with a black "P" displayed. Pilots must be requested 7 days in advance and confirmed 48 hours before arrival.

Pilotage is compulsory for all vessels bound for Belem.

Vessels unfamiliar with the area should board pilots off Salinopolis for both Rio Amazonas (North Channel) or Rio Para.

Vessels bound for Santana, Macapa, Manaus, and Iquitos disembark the bar pilot and embark the river pilots at Belem, 2.5 miles NW of Ponta do Chapeau Virado. Pilotage in the ports and tributaries of Rio Amazonas is compulsory above Belem.

Depths—Limitations.—The bar at the mouth of the river is encumbered with several banks and shoals. However, fairly deep water lies between them. These dangers can be divided into 3 principal groups, including those lying near the E, central, and W parts of the bar. Most of these dangers break at LW.

Baixo do Espadarte is an extensive shoal of sand lying about 7 miles N of **Ponta da Tijoca** (00°33'S., 47°53'W.).

Ponta da Tijoca, from which a light is shown, is low and end in a flat sandy beach. Baixo do Espadarte breaks near its E part and dries at LW in its SW part.

A wreck marked by a light and from which a racon transmits, lies on the bank about 7 miles N of Ponta da Tijoca.

The position of the wreck changes due to the force of the tidal currents.

Coroa Nova, over which the sea always breaks, lies SW of Baixo do Espadarte and about 2 miles WNW of Ponta da Tijoca. The contour of the NE portion of the sandbank varies constantly. The tidal currents attain rates of 5 to 6 knots in the vicinity of Coroa Nova.

Coroa des Gaivotas, which uncovers at low tide, has its N end lying 7 miles W of Ponta da Tijoca. A beacon marks the NW side of the shoal.

Banco Piraquembaua de Fora consists of two spits, Cabeco do Norte and Cabeco do Sul. Cabeco do Norte with a least charted depth of about 7m, lies about 14 miles N of Ponta Curuca. Cabeco do Sul has a least charted depth of 5.4m. Both banks break in rough weather.

Banco Xingu (00°20'S., 47°54'W.) extends in a general NE to SW direction veering to the N. The shallowest part of the sandbank, being about 1m, lies about 12 miles NNW of Ponta da Tijoca.

Banco do Clemente, which partially dries at LW, lies about 2 miles SW of Banco Xingu and about 11.2 miles NW of Ponta da Tijoca.

Bancos da Tijoca consist of three spits of hard sand, Cabeco do Sul, Cabeco do Meio, and Cabeco do Norte.

Cabeco do Sul, the most extensive and shallowest, uncovers 0.2m at LW in a position about 9.2 miles NW of Ponta da Tijoca.

Cabeco do Meio, with a least depth of 2.5m, breaks at LW and requires the most care as it extends the farthest into Canal do Espadarte. Cabeco do Norte, which also breaks at LW, is the deepest with least depths of about 4.5m.

Banco Sao Joao, with a least charted depth of about 1.9m, lies about 18 miles WNW of Ponta da Tijoca. Several shoals lie between Banco Sao Joao and Bancos da Tijoca.

Cabeco do Joca (00°26'S., 48°48'W.), lying off the W side of Banco Sao Joao, has a least charted depth of 7.6m.

Coroa de Quiriri lies close off the S end of Banco Sao Joao and extends SW and SSW for about 22 miles. There is a depth of 1.5m at its NE end and a sandbank which dries 0.5m near its SW end. The shoal is marked by breakers over its entire length apart from a narrow gap close N of the drying sandbank.

Banco Maguari, with depths of less than 3.6m extends E from Cabo Maguari for about 15.7 miles. Between the cape and Ponta Soure, about 29 miles farther S, Banco Maguari extends up to 6.5 miles offshore tapering off to about 0.7 mile from Ponta Soure.

The E edge of this bank off the cape is marked by breakers during strong winds. The bank is reported to be extending to the NE.

The tidal currents in the vicinity of Banco Maguari set WSW during flooding and ENE during ebbing.

Banco Monjui, composed of mud and sand, has a least charted depth of about 2.7m. The shallowest part, which is indicated by the dark muddy-colored water lying, lies about 2.2 miles E of Cabo Maguari.

There are several shoals, with depths of less than 10m, between Banco Monjui and Banco do Clemente and between Banco Monjui and Banco Xingu.

Canal do Espadarte

1.52 Canal do Espadarte, the principal channel leading into Rio Para, lies between Baixo do Espadarte and Bancos da Tijoca. The breakers on these banks help to mark the channel.

The channel is about 2 miles wide with depths of 12 to 33m over fine white sand.

Other channels are available but are not recommended for large ships and therefore are not described.

The MHW interval in Canal do Espadarte is 10 hours 40 minutes. The mean tidal range is about 2.5m, while the spring range about 3.1m. The flood current sets SW and attains rates of 2.5 to 3.2 knots. The ebb current set NE and attains similar rates.

Between Baixo de Espadarte and Coroa das Gaivotas, the flood current tends to set a vessel away from Coroa das Gaivotas, while the ebb currents tends to set a vessel towards the shoal.

The E shore of Rio Para is low and covered with vegetation.

From Ponta Curuca to Ponta da Tijoca the coast trends W about 5 miles, then SW about 49 miles to Ponta do Chapau Virado. Ponta Curuca is more elevated than the adjacent coasts. Several rivers empty into the waters along this stretch of the coast, dividing the coast into islands.

The land in the vicinity of Ponta Taipu, about 11.7 miles SW of Ponta da Tijoca, when seen from a position N of Baixo do Espadarte appears as a low island, but on a nearer approach it appears as two high elevations joining the land to the SW. A light is shown about 0.7 mile SE of Ponta Taipu. Shallow depths and dangerous rocks lie up to a distance of 2.2 miles off the shore between Ponta Taipu and Ponta do Chapau Virado.

A light is shown close N of Ponta Maria Teresa which lies about 10 miles SW of Ponta Taipu.

A light is shown from the end of a chain of rocks lying off the village of Colares, about 23 miles SW of Ponta Taipu. Colares, situated on a flat sandy shore, is sheltered from the sea by these rocks.

The rocks uncover at half tide and form a natural breakwater. A small church, painted white, is located in the village.

Ilha das Pombas, about 8 miles NE of Ponta do Chapau Virado, is covered with vegetation. The island appears attached to the mainland at first as it is separated from the shore by only a short distance.

A ridge of rocks extends about 1 mile N from the island and along the shore to the E. The sea is sometimes rough near these rocks, especially during the flood tide.

A light is shown from Ponta do Chapau Virado. A chain of dangerous rocks, some of which uncover, lie about 0.5 mile N of Ponta do Chapau Virado.

The W shore of Rio Para, between Cabo Maguari and Ponta de Soure, is low, wooded, and flooded during the rainy season.

Between Ponta Soure and Ponta Guarita, about 9 miles S, shoal water lies up to 1.25 miles offshore.

The city of Soure, one of the principal commercial centers of Ilha do Marajo, is situated at the N entrance of Rio Paracuaui (Igarape Grande), the main river on this coast.

A light is shown from the N extremity of Ilha dos Amores, on the S entrance of Rio Paracuaui.

Between Ponte Soure and Ponta Guarita (Ponta de Joanes), about 9 miles S, shoal water lies up to 1.25 miles offshore.

A light is shown from Ponta Guarita.

Coroad Muricoca, which uncovers at LW, lies about 6 miles NE of Ponta Guarita.

Coroa Seca, with a least charted depth of 1m, lies near the middle of the river about 9 miles ESE of Ponta Guarita. This shoal, which breaks at low tide, has been reported to be extending E with deep water near its edges.

Coroinha and Coroa Grande are shoals which dry and are located about 6 miles S of Ponta Guarita. A light is shown about 1.2 miles W of the W edge of Coroa Grande.

Canal do Mosqueiro

1.53 Canal do Mosqueiro, entered between Ponta do Chapau Virado and Ilha Tatuoca about 5 miles SSW, extends about 18 miles S to the berths at Belem.

The channel is calm, even when the wind blows constantly during September, October, and November. The bottom is sand and mud which affords good holding ground.

Ilha Tatuoca (1°12'S., 48°30'W.), the northernmost, and Ilha das Oncas, the largest and southernmost, are part of a chain of islands skirting the coast. These islands form the W side of Canal do Mosqueiro and extend S past the city of Belem. A light is shown from the N side of Ilha Tatuoca.

Ponta do Mosqueiro, about 3 miles S of Ponta do Chapau Virado, is on the E shore of Canal do Mosqueiro. A large building, faced with red bricks, and a warehouse stand on the point. A wooden pier is located about 0.7 mile NNW.

The village of Mosqueiro is situated close N of Ponta do Mosqueiro. A conspicuous chimney is located within the town. Icoaraci, a small town is located on Ponta do Pinheiro, 8.5 miles S of Mosqueiro.

The church towers at Belem become visible just S of Ponta do Pinheiro. Other conspicuous, charted objects can be seen along the E shore.

There are several small piers between Ponta do Pinheiro and the town of Val-de-Caes, about 6 miles S.

An aviation light and an aeronautical radiobeacon are located in the NE part of Val-de-Caes.

Ilha do Forte da Barra lies ESE of the S end of Ilha da Barra in a position about 1 mile N of Val-de-Caes and about 0.2 mile off the E shore. A light is shown from Ilha do Forte da Barra.

Depths—Limitations.—The least depth as far as the berths at Belem was 6.1m, but this depth is subject to change.

Ilha Tatuoca is surrounded by foul ground. The extent of this foul ground varies from 0.15 mile off its E side to 1.75 miles of its NW side. Rocks, some of which uncover at LW, are scattered throughout the foul ground. A lighted buoy marks the NE extremity of the foul ground, about 1 mile NE of Ilha Tatuoca.

Scattered submerged rocks fringe the E shore between Ponta do Pinheiro and Val-de-Caes.

A lighted buoy, which marks foul grounds, is moored about 0.2 mile WNW of Ponta do Pinheiro.

1.54 Ilha da Barra (1°22'S., 48°30'W.) lies near the middle of the channel. Depths of less than 5.5m extend about 1 mile N. A spit, with depths gradually increasing to 5m, extends slightly more than 1.25 miles SSW. A rock, with a depth of less than 2m, lies 0.5 mile WNW of the S extremity of the island.

Pedras da Barra, with a least depth of 0.5m, lies about 0.4 mile NNE of Ilha do Forte da Barra nearly in mid-channel between the E shore and Ilha da Barra.

Pedro do Forte, a flat rock with a depth of 5.1m lies about 0.3 mile SW of Ilha do Forte da Barra. A lighted buoy is moored close W of Pedro do Forte.

Pedras Val-de-Caes, with depths less than 1.8m, lie about 1 mile SSW of Ilha do Forte da Barra. A lighted buoy marks the SW side of this danger.

Mariners should use maximum caution when navigating in the area of **Ilha do Cruzador** (1°22'S., 48°31'W.). There is the existence of a possible bank due to the disappearance of Cruzador Island.

Belem (1°27'S., 48°30'W.)

World Port Index No. 12490

1.55 The port of Belem is the most important commercial port on the N coast of Brazil.

The port is situated on the E bank of Rio Para about 70 miles from its mouth. Communication is maintained with all inland Amazon ports.

Winds—Weather

The winds during the summer mornings are usually calm, or a light breeze blows from E to NE, changing gently to the N.

Fresh winds from the NE and ENE normally blow on summer afternoons, lasting until sunset, followed by a calm that lasts through the night.

During the rainy season from March until June, Winds are variable and sometimes accompanied by squalls. Rain falls almost daily during the rainy season and in the dry season on an average of about 15 days, mostly in the afternoon.

Tides—Currents

The MHW interval at Belem is 11 hours 4 minutes. The spring range is about 3m and the mean range is about 2.4m.

Under normal conditions, during spring tides, the flood current has a velocity of 2.6 knots and the ebb current 1.4 knots. During neap tides the flood current has a velocity of 2.4 knots and the ebb current 1.1 knots.

The times of HW and the rates of the current are, however, influenced by the force and direction of the wind and by the amount of rainfall in the river basin. Rates in excess of those stated may be experienced.

The tidal currents set toward the berths in Belem; therefore, ships should let go an anchor before mooring.

Depths—Limitations

The approach to Belem is made through the Canal do Mosquero, previously described. The maneuvering room in this stretch of water is considerably more restricted than in the Rio Para.

Approximately 1 mile S of Punto do Pinheiro, the channel narrows to 1 mile.

A dredged channel 90 to 180m wide over a depth of 4.2m at LW, leads near the shore from Miramar to the berths at Belem.

This channel is marked by lighted buoys. However, the charted positions of the buoys are not to be relied upon.

The principal quay is about 2,296m long and is divided into the following uses:

Ocean-going	1,260m
Coastal	600m
Small craft	436m

The berths are numbered 1 to 13, starting from S Berths Nos. 1 through 5 are berths used for cargo handling.

The length of these berths range from 300 to 385m with an alongside depth from 5 to 7m.

The berths that are reserved for ocean-going vessels are, as follows:

Berth Number	Max. draft	Length
6	4.8m	385m
7	4.8m	385m
8	8.0m	100m
11	6.4m	262m
12	6.4m	262m
13	8.0m	110m

The remainder of the berths, except for 9 and 10, where mooring is not allowed, have depths alongside from 3 to 4.8m.

It has been reported that the port is silting up gradually, for lack of dredging.

The maximum draft for berthing is 6.7m fresh water for vessels less than 160m in length. For vessels exceeding a length of 160m, the maximum draft for berthing is 6.4m fresh water.

A new berth has been added close S of the T-shaped berth. Length of the platform is 40m with an alongside depth of 7.9m. Vessels moor to four dolphins.

Vessels with deeper drafts operate at the anchorage of Val-de-Caes or Mina Gerais, 7.9m or of Icoaraci 9.8m.

There is a 142m long T-head tanker pier at Miramar, with depths of 7.3 to 9.1m which can accept ships up to 170m long and drafts of up to 7.9m.

Berthing is reported to be carried out only on and during the flood tide.

Close S of this pier is another T-headed berth, flanked by mooring dolphins and a depth of about 6m alongside. It was reported that the channel to the oil terminal has been dredged to 10m.

Aspect

The city occupies little more than a clearing in the Amazon jungle. The highest point of the city is only 14m and the lower sections of the city become swampy and flooded during the rainy season.

A conspicuous water tower is located in Miramar, about 6.7 miles S of Ponta do Pinheiro.

Two chimneys are located in Curro Velho, 1.25 and 1.75 miles S, respectively, of the water tower in Miramar.

There is also a conspicuous building in Belem, 1 mile S of the S chimney in Curro Velho.

Pilotage

Pilotage is compulsory. Pilots, available day and night, board in position 1°06.0'S, 48°29.6'W. Pilots should be requested 72 hours in advance and confirmed 24 hours prior to arrival.

The pilot boat is a red launch with a black P painted on both sides of the bow. It also flies a red flag with a black P.

Anchorage

There is good anchorage from Ponta do Mosqueiro to the beginning of the dredged channel into Belem; however, the navigator should observe the restrictions with respect to restricted areas and submarine cables. Ships drawing up to 9.1m can anchor and work cargo at Icoraci, off Ponta do Pinheiro.

A prohibited anchorage lies off Miramar and Val-de-Caes with a naval anchorage adjoining it to the N.

Ships are prohibited from anchoring in the seaplane landing and cable areas which lie off the E side of Ilha das Oncas between the S end of Ilha da Barra and the mouth of the Rio Guama.

Anchorage is prohibited in the dredged channel about 1 mile S of the oil terminal at Miramar.

Oil tankers and gas carriers bound for the tanker pier at Miramar should use the designated tanker anchorage SE of Ilha Jutuba, with depths of 6 to 7m.

Temporary anchorage may be taken between the S end of Belem wharf and Banco de Meio in depths of 4.9 to 11.9m.

Vila do Conde (1°33'S., 48°45'W.) have a causeway extending 450m from the shore leading to a jetty which serves an aluminum factory. The outer berth is 292m long and is used for handling bulk cargoes. The inner berth is 251m long and is used for handling general cargo and aluminum ingots. The depths alongside are 12.2m at the inner berth and 18.9m at the outer berth. The maximum permissible draft is governed by the fairway depth in Rio Para.

Passo do Goiabal

1.56 Passo do Goiabal, not named on any chart, is a route for ascending the Rio Para above Belem. It is entered between Banco do Otelo and Ilha Mandii, about 40 miles WSW of Belem.

The passage continues S of Ilha Joroca, N of Ilha Sara curuca and Ilha Tucumanduba, between Ilha Mutumura and the island NW of it, S of Ilha Chaves and Ilha Santo Antonio, and N of Ilha Paqueta.

Depths in this passage range from 6.2 to 26m. A bank extends about 3 miles E of Ilha Joroca, the E most of these islands which, when combined with the bank extending from Ilha de Marajo to the W of Ilha Mandii, reduces the width of the channel to about 0.5 mile.

A light is shown from the S extremity of Ilha Joroca, and from Ilha Jupatituba, 2 miles to the S. The narrowest part of the pass is about 7 miles W of this section in the strait just N of Ilha Mutumuru.

A shoal, which dries for 0.25 mile E and W, steep-to on its N side, with shoal ground extending about 1 mile to the W, 3.5 miles to the E, and 4.5 miles to the S from the dry part, lies about 2.7 miles E of Ilha Mandii.

Several wrecks lie sunk or stranded from 2 to 7.5 miles E of Ilha Mandii.

The depths are constantly changing in the vicinity of and up to about 10 miles W of Ilha Mandii. Passo do Goiabal should not be attempted at night.

Cocal (1°44'S., 49°31'W.) is a small port located near the S extremity of Ilha Santo Antonio, about 7 miles SW of Ilha Mutumuru. Deep draft vessels can moor at the port.

Asso do Goiabal to Ilha Boiucu

1.57 Westward of Ilha Paqueta, the channel width increases from 2 to 4 miles and remains at this width for about 65 miles to the entrance of Estreito de Breves, then it narrows to about 0.2 mile. The depths in this part of the channel are between 7.3 to 28m. Both banks of the river are covered with dense forest. There are a number of inlets which cut the coast into numerous islands.

Curralinho (1°49'S., 49°48'W.) is located on the N bank of Rio Para about 18 miles WSW of Cocal. A shoal, with a depth of less than 2m, extends about 0.5 mile S of the port. Curralinho is a port of call for most ships navigating the river.

Os Estreitos refers to the various channels W of Ilha de Marajo which connects Rio Para with the main channels of the Amazon River.

There are two channels used by ships, both of which enter the main channel of the Amazon River at **Ponta do Viera** (1°06'S., 51°12'W.).

Estreito de Boiucu is about 90 miles long and 0.2 mile to 1 mile wide. This channel has a least depth of 5.3m in Furo Grande, the narrowest part, about 17 miles above its entrance. Estreito de Breves, N of Estreito de Boiucu, is about 130 miles long and has a least depth of 7.3m. The maximum dimensions of ships using these channels are about 8.5m draft and 137m in length for Estreito de Breves, and 6.7m draft and 183m in length for Estreito de Boiucu.

Breves (1°41'S., 50°29'W.) is located on the N side of Estreito de Breves, about 13 miles above its entrance and 146 miles from Belem. There is a pier 150m in length with an alongside depth of 6.7m where timber is loaded, and several smaller piers for river craft.

Sao Miguel (1°10'S., 50°29'W.), where there is a timber loading berth, stands on the NE bank of Furo dos Macacos, 30 miles N of Breves. Vessels berth alongside the bank, heading NW in a depth of 5.4m, by securing to trees. Care is required approaching the berth as there are a number of ruined piers which are covered at HW.

Ships navigating Os Estreitos should reduce speed before approaching narrow bends and sound signals to warn river traffic.

Ships can anchor in about 12.8m about 10 miles E of Ilha Boluca Light and 0.75 mile S of Ilha das Araras Light, if they do not desire to transit Os Estreitos at night.

Upper Reaches of the Amazon River

1.58 Ships navigating the upper reaches of the Amazon River can do so by way of Rio Para via Passo do Goiabal and Os Estreitos.

Ships leaving Belem round Ilha Tatuoca and steer for Passo do Goiabal.

Canal de Cotejuba also leads from Belem to Passo do Goiabal but this passage is used only by local pilots.

Ships navigating the upper reaches from Canal de Santana can ascend the channel upriver which trends SW for about 103

miles to its junction with Braco de Burupa off Ponta do Jariuba. The channel follows the mainland shore and lies NW of Ilha do Para, Ilha Grande de Gurupa, and all the smaller islands except **Ilhas Aruans** (1°05'S., 51°43'W.). The N part of Ilhas Aruans lies 29 miles NE of Ponta do Jariuba.

Most ports on the Amazon River, excluding Manaus, do not have berthing facilities for accommodating the larger ships transiting the river.

1.59 From Ponta do Vieira (1°06'S., 51°12'W.), the channel trends SW for 33 miles to the city of Gurupa. This stretch of the channel has an average width of 1 mile.

From Ponta do Vieira the channel follows close to the S bank for about 5 miles until abreast of the light at **Floresta** (1°11'S., 51°14'W.). Then the channel trends toward the N bank where it continues until the E end of Ilha Sao Salvador is abeam when it again approaches the S shore.

When crossing from one side of the river to the other, a ship may encounter strong currents, eddies and tide rips.

Gurupa (1°24'S., 51°39'W.) stands on a rocky point 10m high on the SE bank of the river, about 270 miles by river from Belem. The port is used mostly by river boats.

Abreast of the city Braco do Vieira joins with Braco de Gurupa. From here Braco de Gurupa trends SW for 15 miles and is joined from the S by Rio Xingu, the first of the large tributaries of the Amazon River. This branch then turns to the NW for 9 miles between Ilha Grande de Gurupa and Ilha Baixa Grande and joins the main section of the Amazon River off Ponta do Jariuba.

Ponta do Jariuba (1°24'S., 51°57'W.) is the SW extremity of Ilha Grande de Gurupa. Good anchorage, in 15 to 25m is available 1.5 miles SSE of this point.

Ilha das Velhas lies near the N bank of the river W of Ponta do Jariuba; Ilha de Comandai lies close W of Ilha das Velhas. From here, Serra Jutai begins to be visible. This range lies to the N and W of the town of Almeirim. The town is near the W end of Ilha de Comandai and about 3 miles from Belem.

From the junction of Braco de Gurupa the Amazon River trends WSW for about 60 miles to the W end of Ilha Jurupari, which can be passed on either side. The channel N of this island is deep but narrow and the currents are strong. This channel is avoided by ships transiting upriver and frequented by those transiting downriver.

Serra da Velha Pobre, about 300m high, rises almost vertically from the N bank of the river abreast Ilha Jurupari, about 12 miles W of Almeirim.

From Serra da Velha Pobre to Ilha de Parauaquara, about 15 miles W, the river is wide and deep with depths up to 55m.

The navigable channel is then narrowed by islands between Ilha de Parauaquara and the city of Prainha, about 30 miles distant. The current is strong within this part of the channel.

Praina (1°48'S., 53°29'W.) stands on the N bank of the river about 414 miles from Belem. The port is used mostly by riverboats. The tidal range here is about 1m.

A light is shown from **Ponta Peregrino** (1°55'S., 53°50'W.). Ponta Peregrino is the NE point of Ilha do Gurupatuba which lies close to the N bank of the river about 23 miles WSW of Prainha.

The shoals, banks, and islands in the vicinity are constantly changing. Islands of floating objects are often formed, only to be washed away again.

Monte Alegre (2°00'S., 54°04'W.) stands on the slopes of a hill rising from the N bank of Rio Parana de Monte Alegre, 2 miles W of the W extremity of Ilha do Gurupatuba and about 457 miles by river from Belem. Serra Erere and Serra Paituna rise about 10 miles W of Monte Alegre.

Lago Monte Alegre (Lago Grande), one of the largest lakes in the vicinity of the river, lies S of these mountain ranges.

The lake increases in size during the rainy season and sometimes unites with the river.

From Ilha Faraday, lying 1.5 miles S of Ilha do Gurupatuba, the river trends S for about 17 miles to Ilha do Curua, which may be passed on either side. A dangerous shoal surrounds the SW end of the island and must be avoided.

From the SW end of Ilha do Curua, the river trends generally W for about 39 miles to Ponta Negra, the N entrance point of Rio Tapajos. Ponta Negra should be given a wide berth because a shoal, with depths of less than 2m extends 1 mile E from this point.

1.60 Santarem (2°25'S., 54°43'W.) ([World Port Index No. 12510](#)) stands on the S side of the mouth of the Rio Tapajos, 1 mile S of Ponta Negra, and 516 miles by river from Belem. An L-shaped wharf lies 1.25 miles SW of Ponta Negra.

Its outer face is 200m long, with a depth of about 10m alongside. Small craft can berth on the 180m long inner section, which has a depth of 6m alongside.

During low stages of the river, tidal currents are felt in Rio Tapajos. During times of tidal influence, the water appears yellow.

Vessels can obtain anchorage with good holding ground abreast of the city in depths of 15 to 20m.

Pilotage is compulsory. Pilots are embarked at Belem or Macapa.

From the mouth of Rio Tapajos the Amazon River trends NW for about 16 miles to the W end of Ilha des Marrecas, from which a bank extends 1.5 miles NNW. The channel E and N of the island is the preferred channel. From the island the river trends W, passing S of Ilho do Marimarituba and N of Ilha do Patacha. Depths in this area are likely to change rapidly.

From this point the river channel trends NW for about 35 miles to the city of Obidos, passing S of Ilha do Meio and Ilha do Mamauru. This part of the river is apparently free of dangers but the current is strong.

Between Santarem and Obidos, the river banks are low. During the rainy season these banks are almost under water except on the S side abreast of Ilha Marimarituba which forms a cliff about 45m high.

Near the S bank of the river between Ilho do Marimarituba and Obidos, lies Lago Grande de Vila Franca which is joined with the Amazon River by several openings.

The lake is said to be navigable in the greater part of its extent.

1.61 Obidos (1°55'S., 5°31'W.) ([World Port Index No. 12530](#)) stands on the N bank of the river, about 584 miles from Belem. The town stands on a cliff 20m high overlooking the

river. The river at this point is narrow, with depths of 40 to 100m and the current is extremely strong.

Obidos is the farthest port up-river at which the tide is felt. An eddy, with a rate of 2 or 3 knots, runs NW along the N bank and is felt from 0.2 to 0.4 mile offshore. The port can accommodate vessels up to 7,000 dwt.

The port has a wharf that is used during the HW season by ships of considerable tonnage.

Because of the countercurrent that forms next to the wharf, it is recommended that ships moor port side-to. Length of the berth is 35m with an alongside depth of 10m.

Vessels can anchor, in 10 to 20m about 45m offshore. The bank is steep-to and consists of soft mud.

Porto Trombetas (1°28'S., 56°23'W.) stands on the Rio Trombetas, 60 miles above its mouth which lies 5 miles W of Obidos. Vessels of 50,000 dwt can be handled. The port exports bauxite. The largest vessel that can be accommodated is 245m long. During HW (January through July), currents may reach a speed of 2 knots.

Depths—Limitations.—The loading berth consists of a 100m long pier, four dolphins, and four mooring buoys. The air draft is 13.5m (minimum) July and 19m (maximum) in December. Draft is restricted to 11.3m from January to July and 11m from August to December. There is a tanker berth upstream and a general cargo wharf downstream from the terminal.

Pilotage.—Pilots embark and disembark at the anchorage off Porto de Santana. ETA at Barra Norte is required 72 hours in advance.

Anchorage.—Vessels awaiting a berth anchor W of the mouth of Rio Trombetas, with good holding ground. Vessels may not enter the river until permission is given because of restrictions on passing vessels leaving.

1.62 From Obidos the river channel trends WSW for 30 miles to Ilha de Santa Rita. This island may be passed on either side. The N side has the greater depths. Silting in the S passage makes local knowledge essential for vessels navigate this channel.

Then the river trends SW for about 60 miles to the town of Parintins, passing Ilha de Juruti, Ilhas do Caldeirao (Caldeiroes), and Ilha Parintins. The main channel is N of Ilha de Juruti and S of Ilhas do Caldeiroa. There is also a deep channel N of Ilhas do Caldeiroa. Serra de Parintins, two hills about 120m high, rise on the S bank of the river E and S of Ilhas de Caldeiroa.

Parintins (2°38'S., 56°44'W.) stands on cliffs on the S side of the Amazon River about 697 miles from Belem. There is a municipal pier where vessels can berth alongside at most times of the year. Vessels should berth port side-to as there is a strong countercurrent.

From Parintins the river trends W for 20 miles where it divides into two channels. Parana do Mocambo, the N channel, lies between the N bank of the river and Ilha do Arari and Ilha do Mocambo (Pacoval).

The S channel lies between Ilha das Oncas and the S bank of the river. The N channel is narrower but shorter and ships generally use this channel.

West of these islands the river is about 2 miles wide and trends NW for 10 miles. The river then turns sharply trending

SW for about 85 miles to the town of Itacoatiara. There are several islands and drying banks in this part of the river. The current has a rate of about 3 knots S of Ilha Grande do Serpa (Ilha do Risco) which lies about 3 miles E of Itacoatiara.

1.63 Itacoatiara (3°09'S., 58°27'W.) ([World Port Index No. 12540](#)) stands on the slope of a hill on the N bank of the river, 817 miles from Belem. Vessels lie bow to the shore on a single mooring as the current keeps them at right angles to the bank. Vessels berth in this manner in front of the clocktower square.

There is a floating pier 62m long owned by a private company that permits ships to moor but this depends on the level of the river.

From Itacoatiara the river trends S for 24 miles to the entrance of Rio Madeira. A long this stretch of the river lies Ilha da Trindade, which can be passed on either side. The channel S of Ilha da Trindade has greater depths near the S bank of the river. The S shore of Ilha da Trindade is bordered by a shoal which extends about 1.2 miles offshore.

The channel N of Ilha da Trindade is narrower and is available only to ships of light draft as a rocky patch, with 3.7m at low river, lies about 0.8 mile N of the W extremity of that island.

From the entrance of Rio Madeira, the Amazon River trends WNW to the confluence of Rio Negro, the first large tributary of the Amazon River on its N bank. The port of Manaus is on the N bank of Rio Negro near its mouth, 108 miles from Itacoatiara.

About 13 miles E of Manaus, a chain of rocks extends about 1 mile from the N bank of the Amazon River and between them is the mouth of Furo do Jacare. Close W, still in front of this chain of rocks and about 0.2 mile outward, lies Pedro do Jacare. At this point the S side of the channel is formed by Ilha da Terra Nova. A light is shown from Pedro do Jacare.

Pedras Moronas lie S of the fairway, abreast of the above-mentioned chain of rocks, and about 1 mile NW of the W extremity of Ilha da Terra Nova. A light is shown from Pedras Moronas.

Pedras Lejes, a ledge of submerged rocks extending from the N bank of the Amazon River near its junction with Rio Negro, lie about 8 miles E of Manaus. A lighted buoy is moored on the N side of Pedras do Anselmo, about 4 miles SE of Manaus.

Pedras Bom Jardim, submerged rocks extending about 1 mile from the N bank of Rio Negro, lie about 3 miles E of Manaus. Pedras de Belem, a rocky shoal marked by a lighted buoy, lie about 2 miles E of Manaus, abreast of the mouth of Igarape Educandos. Igarape Educandos flows into Rio Negro close E of Manaus.

1.64 Manaus (3°08'S., 60°01'W.) ([World Port Index No. 12560](#)) stands on high ground overlooking Rio Negro, 8 miles from its confluence with the Amazon River and 925 miles from Belem. The river abreast of the city is 1.5 miles wide with depths up to 45m. The S bank is low and marshy. Drying mud banks line both sides of the river.

Winds—Weather.—Winds from the NE are predominant in this area. The mean daily maximum temperature reaches 33°C in September and the mean daily minimum temperature is between 23° and 24°C all through the year.

Tides—Currents.—There is practically no current near the berths but in the middle of the river the current has rates from 1 to 3 knots which varies with the seasons and periods of flood or ebb tides. The season of the greatest floods occurs during June and July while the season of the greatest ebbs occurs during November and December. The mean range of the river level is 11.5m.

Depths—Limitations.—The berthing area of the port consist mainly of two floating pontoons, connected to the shore by a floating roadway, bridges and overhead cables.

There are also small pontoons for the use of river craft. The pontoons provide a total of 1,000m of berthing with depths of 20 to 35m. Mooring buoys for the use of ships which do not berth are moored parallel to the pontoons.

Plans call for a third pontoon above the existing ones. In addition to the floating pontoons there is a fixed wharf and 3 piers which, however, can only be used during the high river season.

Copam Terminal lies about 6 miles downstream from Manaus and stands on the N shore of the river. Tankers up to 30,000 dwt berth starboard side-to at a 50m long pontoon and secure with an anchor and a mooring buoy ahead and two mooring buoys astern. A terminal for the discharge of aviation gas is situated 0.4 mile WSW of the oil terminal.

Pilotage.—Pilotage is compulsory. Vessels calling at Manaus are served by the Pilots of the Amazon Basin, two embark at Belem for the round trip voyage. Vessels entering via the N bar take on the pilot off Santana. There is no local pilotage service at the port of Manaus.

Anchorage.—Anchorage may be obtained anywhere off the city in depths from 28 to 34m, mud and sand. The current in this vicinity averages 2 knots. The quarantine anchorage is located in front of Ponta do Catalao in depths of 18 to 20m.

The best anchorage for ships waiting to moor at Copam Terminal is in depths of 20 to 40m sand, below Ilha Marapata in mid-river abreast Paredao Agricultural School, which lies slightly below the terminal.

The Amazon River, known as Rio Solimoes above its junction with Rio Negro, trends WSW then WNW to the vicinity of the meridian 66°W, where Rio Jurua flows into it from S. In this reach Rio Solimoes connects with Rio Japura from N and with Rio Purus and Rio Tefe from S.

Rio Solimoes then trends WSW to the town of Tabatinga. Five miles W of Tabatinga and in Columbia, is Leticia.

To the S of Leticia on the opposite shore is the mouth of Rio Javari which forms the Peruvian boundary. Rio Solimoes trends WNW from here to Iquitos, Peru which is 271 miles from Tabatinga.

The Amazon River above Tabatinga is known as Rio Marañon.

1.65 Codajas (3°50'S., 62°05'W.) is about 164 miles from Manaus and stands on the N bank of Rio Solimoes. The port affords good anchorage, with mud bottom, in front of the city where the current is weak. Small vessels can use the river bank for mooring.

Coari (4°07'S., 63°07'W.), located about 237 miles from Manaus and stands on the S bank of Rio Solimoes. Vessels moor to the river bank in an area of about 198m with a depth of

7m and very little currents. There are wooden stakes on the river bank for attaching mooring lines.

Tefe (3°22'S., 46°42'W.), located about 366 miles from Manaus and stands on the S bank of Rio Solimoes at its junction with Lago Tefe. The port affords good sheltered anchorage in a depth of 8m with very little current.

Fonte Boa is located on the S bank of Rio Solimoes, about 478 miles from Manaus. The port affords good anchorage in depths of 8 to 10m with almost no current. Vessels can moor to the river bank.

Porto Afonso (2°44'S., 66°55'W.) is situated close below the mouth of Rio Jutai, about 561 miles from Manaus. There are frequent severe storms, with predominating NE winds, in this area. Small vessels can moor to the river bank in depths of 3 to 5m. There is an anchorage that offers shelter from storms.

Tonantins (2°47'S., 67°47'W.) is located on the N bank of Rio Solimoes, close to the mouth of Rio Tonantins, about 624 miles from Manaus. Approach to the port should be made from the middle of the channel in order to allow the ship to head into the countercurrent which is formed by the eddy. The current in the middle of the channel is strong but weakens close to the river bank. The anchorage is safe and sheltered.

Anto Antonio do Ica (3°05'S., 67°57'W.), about 641 miles from Manaus, stands on the N bank of Rio Ica nears its junction with Rio Solimoes. The port has a safe anchorage, sheltered from the prevailing E wind, in depths of about 4 to 7m. Vessels can moor to the river bank.

Sao Paulo de Olivenca (3°27'S., 68°48'W.) on the S bank of Rio Solimoes, about 723 miles from Manaus. Anchorage, is afforded in front of the port in a depth of 11m, mud bottom. It is possible to moor to the river bank without much difficulty.

1.66 Benjamin Constant (4°22'S., 70°02'W.) lies on the S bank of Rio Solimoes at its junction with the lower mouth of Rio Javari, about 870 miles from Manaus.

All ship maneuvers have to be made in Rio Solimoes since the Rio Javari is very narrow.

At the site of the anchorage, close to the bank, wooden stakes have been installed to aid in mooring.

Caution should be exercised to avoid grounding during the LW season.

Tabatinga (4°15'S., 69°57'W.) is located on the N bank of Rio Solimoes, about 869 miles from Manaus and near the boundaries of Columbia and Peru. The port has two wharves which are suitable for small craft. There are two anchorage areas, with depths of 8 to 10m, and very weak river current.

Leticia (4°09'S., 69°57'W.) stands on the N bank of Rio Marañon, about 5 miles NW of Tabatinga. Anchoring is not recommended in view of the strong current fronting the port, which may attain a rate of 2.3 knots.

Iquitos (3°58'S., 73°22'W.)

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1.67 The port of Iquitos, about 1,146 miles from Manaus, is the capital of the Peruvian Department of Loreto, the

commercial center of the region. The port stands on the N bank of Rio Marañon between the city and a small island which lies parallel to and about 0.5 mile from it. A strong current at the port maintains a deep channel close off the city.

The river level begins to drop in mid-May at Iquitos whereas at Manaus this occurs during the end of June. At Iquitos, the range between normal low and high river is about 7.5m, but this range varies from year to year.

The port can be reached by ships drawing 4.6m year round. From June through August in the HW season, ships drawing up to 7.3m can reach the port.

Anchoring in the vicinity of the port is not recommended as there are several wrecks whose positions are not accurately known.

Vessels berth at a floating metal pontoon dock, 240m in length and can accommodate two ocean going vessels at one time.

Care is required while maneuvering along the pier so as not to break the lines as the eddies and currents are strong.

At times the ship is pushed against the pier and at other times the ship is set away from the pier. Bow lines should be secured as soon as possible and the bow should not be allowed to swing away from the pier. The current alongside the pier attains a rate of about 1 to 2 knots.

It is stated that vessels drawing up to 4.3m can reach Ciudad de Yurimaguas on Rio Huallaga, a tributary of Rio Marañon, 354 miles above Iquitos, without difficulty.

Tributaries of the Amazon River

1.68 The principal tributaries on the N bank of the Amazon River in Brazil are: Rio Negro and its tributary Rio Branco, Rio Japura, and Rio Ica.

The principal tributaries on the S bank are: Rio Tocantins, Rio Xingu, Rio Tapajós, Rio Madeira, Rio Purus, and the tributaries; Rio Acre, Rio Tefe, Rio Jurua, and Rio Javari.

Pilots for the rivers of Tocantins, Madeira, and Purus can be best obtained at Belem, and for the other tributaries of the Amazon at Manaus.

Rio Tocantins is about 1,600 miles long, flows N through Brazil and discharges its waters by a mouth about 10 miles wide into Rio Para, about 40 miles WSW of Belem.

Although Rio Tocantins is considered one of the tributaries of the Amazon River, the river does not, strictly speaking, belong to the Amazon River System. The principal tributary of Rio Tocantins is Rio Araguaia which rises in about latitude 18°S.

To enter Rio Tocantins, a ship can pass on either side of Banco do Otelo, a large drying sandbank, the NE extremity of which lies about 9 miles E of Mandii Light. The channel between Ilha Mandii and Banco do Otelo should not be attempted at night.

Rio Tocantins is navigable by small craft for about 120 miles above Cameta. The land is low and wooded. Its general appearance is so uniform that it is difficult to distinguish one part from another. Local knowledge is necessary for safe navigation.

Anchorage can be taken in about 14m about 0.2 mile off Cameta.

Cameta (2°15'S., 49°30'W.) ([World Port Index No. 12500](#)) stands on the W bank of Rio Tocantins, about 90 miles from Belem. The town is built on the river bank and is an important trade center. The tidal range is about 3m and the current attains a rate of about 2.5 knots.

1.69 Rio Xingu (1°32'S., 51°52'W.) is about 1,200 miles long and can be navigated for about 105 miles above its mouth to Cachoeiras de Itamaraca. It can be navigated by vessels with drafts of up to 2.5m during the HW season, from February to July.

Rio Tapajós flows into the Amazon River near Santarém. The river is navigable for about 170 miles above the city to the first falls.

At low and middle periods of the river level, the tidal currents are felt. These currents can be seen by the presence of yellow water in the river which is normally clear.

Fordlandia (3°40'S., 55°30'W.) is located on the E bank of the Rio Tapajós, about 98 miles from the river mouth. There is a small pier with depths of 3.7m at LW and 9m at HW. The port is used mainly for the export of rubber and lumber.

1.70 Rio Madeira (3°23'S., 58°46'W.) is the most important tributary of the Amazon River. It is near the W end of Ilha da Trindade.

The river rises in the S part of Bolivia and has a total length of about 2,000 miles. A number of tributaries branch out from Rio Madeira.

Porto Velho (8°46'S., 63°54'W.) stands on the E bank of Rio Madeira, about 611 miles from its mouth. The port can be reached by vessels with drafts up to 6.1m at HW and 2.1m at LW. The range of the river is about 12m and the current has a velocity of 4 to 6 knots.

Above Porto Velho, a stretch of the river is impassable due to rapids, but above the rapids, its tributaries Rio Mamore and Rio Guapore, which forms the boundary between Bolivia and Brazil, are navigable by river craft for a distance of 400 miles.

1.71 Rio Negro enters the Amazon River near Manaus, about 917 miles from Belem.

The river is navigable by boats up to the town of **Santa Isabel** (00°25'S., 65°01'W.), 423 miles from Manaus.

Off Manaus, the river is about 2 miles wide. Above Manaus the river widens forming Baía de Boiucu and then narrows again about 60 miles farther, off Ponta da Tatuquara.

Along most of the stretch from Manaus to Santa Isabel the riverbanks are difficult to distinguish due to the presence of the great number of islands.

Navigation along the river banks is not possible, especially at low river, due to extensive shoals and sand flats which are often awash and between which the fairway winds.

The river bed is rocky near Santa Isabel and during the dry season there may be one or two passes with depths of not more than 1m. The river level begins to rise about 2 months later than that of the Amazon River and has a range of between 6 and 8m.

1.72 Rio Branco is the largest and most important tributary of Rio Negro and joins it 193 miles above Manaus. It is formed by the confluence of 5 rivers, all of which rise near the

Venezuelan and Guyanese borders. It has a range of 8m near its mouth and 6m in its upper reaches.

The current averages 2 knots. It is navigable by vessels up to 3.6m draft for a distance of 200 miles.

Boa Vista (2°49'N., 60°40'W.) is the principal town on the river. The river banks are low for the greater part of the lower reaches from its mouth with small lakes in the neighboring forests, even during the dry season. In the upper reaches, the riverbanks are higher.

Rio Purus rises in Peru and enters Rio Solimoes from the SW about 117 miles from Manaus. The river is navigable year round for a distance of 715 miles by vessels with drafts of up to 2.7m. The range of the river varies from 10 to 17m. The current varies from 2 to 6 knots.

Rio Acre, the main tributary of Rio Purus, is navigable at high river as far as the town of **Xapuri** (10°39'S., 68°31'W.), about 350 miles above its mouth and near the boundary with Bolivia.

Rio Japura enters the N bank of Rio Solimoes from WNW. Rio Japura is navigable during the dry season by small craft drawing up to 1m.

During the rainy season river craft can ascend for about 400 miles to Vila Bittencourt.

Vila Bittencourt (1°27'S., 69°25'W.), the farthest port in Brazil, stands on the N bank of Rio Japura near the boundary with Colombia.

Rio Jurua rises in Peru and enters the S bank of Rio Solimoes, about 511 miles from Manaus. The river is navigable year round as far as the mouth of Rio Tarauaca for about 1,198 miles from its junction with Rio Solimoes. During the rainy season Rio Jurua is navigable 1,030 miles farther to the mouth of Rio Breu.

Cruzeiro do Sul (7°39'S., 72°37'W.), one of the leading towns of Territorio do Acre, is situated on Rio Jurua, about 686 miles from the mouth of Rio Tarauaca.

Rio Tarauaca is navigable during the rainy season as far as the city of Tarauaca situated on the W bank.

1.73 Rio Ica (Rio Putumayo) enters the N bank of Rio Solimoes about 640 miles from Manaus.

The river is navigable by small craft drawing up to 1.5m as far as **Puerto Leguizamo, Colombia** (00°12'S., 74°46'W.).

Rio Ica is one of the most important tributaries of the Amazon River due to the mineral and vegetable products found in its vicinity.

The river is about 900 miles long and has several tributaries, some of which are navigable.

The river rises from March to July and falls from August to February.

The current runs from 1 to 3 knots in its lowest part and from 3 to 7 knots in its upper part.

Rio Javari (Rio Yavari) enters the S bank of Rio Solimoes near Benjamin Constant.

The greater part of this river forms the boundary between Brazil and Peru.

Rio Javari is tortuous but the river is navigable by small craft during the rainy season.

Rio Napo rises in Ecuador on the E slope of Volcan Cotopaxi and enters on the N bank of Rio Marañon, about 42 miles below Iquitos.

The river is sluggish with depths of about 1.2m and is navigable by river craft of light draft as far as its junction with Rio Coca, about 523 miles above its mouth.

Rio Napo is swift above its junction with Rio Coca where the river bed changes from shifting sand to rock.

Rio Pastaza rises in the central part of Ecuador and enters on the N bank of Rio Marañon in about 4°53'S, 76°20'W.

The river is navigable by small river craft for about 180 miles from its mouth during the dry season and for about 300 miles during the rainy season.

Rio Pastaza is obstructed by sandbanks and snags and its rise and fall are rapid and uncertain.

1.74 Rio Morona rises in Ecuador on the E slope of the main chain of the Andes and enters Rio Marañon near the town of **Borja** (4°26'S., 77°33'W.).

The river is navigable by small river craft for about 300 miles during the rainy season. Canoes can ascend many of its branches.

Rio Morona flows through a fertile region and gold washing takes place on its banks.

Rio Ucayali rises in the S part of Peru and enters the S bank of Rio Marañon in about longitude 73°30'W. The river is navigable by coasters as far as its junction with Rio Apurimac, about 800 miles above its mouth.

Pucallpa (8°22'S., 74°32'W.) stands on the W bank of Rio Ucayali, about 533 miles from Iquitos. The town maintains regular river service with ships of 3,000 dwt.

There is a wooden wharf at which ships can berth at any level of the river. The controlling depths at high and low river are about 9m and 2.7m, respectively.

Rio Huallaga rises in the mountains of Peru and enters the S bank of Rio Marañon in about latitude 5°S.

The river is navigable by river boats as far as Yurimaguas, about 96 miles from its mouth, and by launches as far as Chasuto, about 181 miles from its mouth.